National University of Ireland, Cork

Urbanization Effects on Welfare and Income Diversification Strategies of Peri-urban Farm Households in Tigray, Northern Ethiopia: An Empirical Analysis

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Acronyms

ADLI – Agricultural Development Lead Industrialization

BoFP – Bureau of Finance and Plan of Tigray Regional State

CPI – Consumer Price Index

CSA – Central Statistics Agency of Ethiopia

DD – Difference in Difference

EDRI – Ethiopian Development Research Institute

EEA – Ethiopian Economic Association

EfD – Environmental for Development

ETB – Ethiopian Currency known as Birr

FDRE – Federal Democratic Republic of Ethiopia

FE – Fixed Effect

GDP – Gross Domestic Product

HT – Hausman Taylor

MoARD – Ministry of Agriculture and Rural Development of Ethiopia

MoFED – Ministry of Finance and Economic Development of Ethiopia

MoWUD – Ministry of Work and Urban Development of Ethiopia

PPI – Producer's Price Index

PUAs – Peri-urban Areas

RE – Random Effect

SSA – Sub-Saharan Africa

TRS – Tigray Regional State

TLU – Tropical Livestock Unit

UNFP – United Nations Fund for Population

UNFPA – United Nations Fund for Population Activities

UN-HABITAT- United Nations Center for Human Settlement

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Abstract

Urban areas in many developing countries are expanding rapidly by incorporating nearby subsistence farming communities. This has a direct effect on the consumption and production behaviours of the farm households but empirical evidence is sparse. This thesis investigated the effects of rapid urbanization and the associated policies on welfare of subsistence farm households in peri-urban areas using a panel dataset from Tigray, Ethiopia. The study revealed a number of important issues emerging with the rapid urban expansion. Firstly, private asset holdings and consumption expenditure of farm households, that have been incorporated into urban administration, has decreased. Secondly, factors that influence the farm households' welfare and vulnerability depend on the administration they belong to, urban or rural. Gender and literacy of the household head have significant roles for the urban farm households to fall back into and/or move out of poverty. However, livestock holding and share of farm income are the most important factors for rural households. Thirdly, the study discloses that farming continues to be important source of income and income diversification is the principal strategy. Participation in nonfarm employment is less for farm households in urban than rural areas. Adult labour, size of the local market and past experience in the nonfarm sector improves the likelihood of engaging in skilled nonfarm employment opportunities. But money, given as compensation for the land taken away, is not crucial for the household to engage in better paying nonfarm employments. Production behaviour of the better-off farm households is the same, regardless of the administration they belong to. However, the urban poor participate less in nonfarm employment compared to the rural poor. These findings signify the gradual development of urban-induced poverty in peri-urban areas. In the case of labour poor households, introducing urban safety net programmes could improve asset productivity and provide further protection.

Key words*: employment, farm household, income diversification, nonfarm, matching, peri-urban, shock, urbanization, vulnerability, welfare*

CHAPTER 1: INTRODUCTION TO THE RESEARCH

1.1 Background to the Research

Rapid urbanization, referring to both urban population growth and physical area expansion of urban centers, is an inevitable phenomenon in the world. Urban centers, such as small cities and towns, are central to the current urbanization process because small cities are changing to large cities and towns are changing to cities rapidly (Cohen, 2004; Simon, 2008). Most of these swift changes are observed in developing countries[1]. These countries have the lion's share of current urban expansion and their contribution to the growth of world urban population (Un-Habitat, 2010a). For instance, the proportion of urban population in developing countries is expected to increase from 47% in 2011 to 64% by 2050 (United-Nations, 2012). Although urbanization in most developing countries is associated with multifaceted problems, it can offer numerous opportunities for better living standards (Tacoli, 2012).

Urbanization in most Asian countries is based on structural transformation which is the result of either investment in agricultural technology such as "the green revolution" or industrial expansion induced by domestic and foreign investment (Kelly, 1999; Webster, 2002; Webster and Muller, 2002; Webster et al., 2004). The latter is similar to the urbanization process of developed countries. However, urbanization in Africa is mostly due to natural growth, rural-urban migration and reclassification of urban physical boundaries by incorporating those previously known as rural villages (Montgomery, 2008).

Africa is achieving steady economic growth and is in a state of rapid urbanization. But the urbanization process is largely characterized by informal settlements and informal working environments (World-Bank, 2013). For instance, about 70% of the urban residents in sub-Saharan Africa live in shanty areas (UN-HABITAT, 2003;

[1] The term developing countries is contestable because of its ambiguity. This thesis adopts the World Bank's classification of developing countries which consists of low-income and middle-income countries and which acknowledges the existence of differences in their levels of development.

UNFPA, 2007; World-Bank, 2013). Similarly, problems related to infrastructure, waste management, land and water pollution, housing and employment are widespread in urban Africa. Sources indicate that about 50% of the African population will live in urban areas by 2035 (United-Nations, 2011). But it is hard to claim that urban expansion in Africa is due to substantial industrialization (Simon, 2008) because the manufacturing sector - a sector expected to employ the extra labor freed from agriculture - is very small.

Urbanization in Africa is a recent phenomenon where urban areas are expanding at alarming rate although little is being done to improve the sub-optimal social and economic infrastructures of the urban centers. Many studies, directly or indirectly, express urban expansion in Africa as "urbanization of poverty" (Ravallion, 2002; Un-Habitat, 2003; 2004; Tacoli, 2012) and urban areas of many African countries have been expanding even at times of poor economic performance (Fay and Opal, 2000; Henderson, 2003; Cohen, 2004). Although the existing urbanization trend in Africa is facing difficulties in terms of availability of infrastructures and employment generation, Africa's urban growth rate is expected to remain at about 2% per annum until 2050 (Montgomery, 2008) which is higher than the East Asian countries (UNFP, 2007). This growth rate is expected to be higher for sub-Saharan Africa in general as the existing level of urbanization is much lower compared to the North African countries (Un-Habitat, 2010a).

Given the widespread problems in urban Africa, vast and everlasting urban expansion is an inevitable feature of the continent. Usually, peripheries of the urban centers are the preferred sites for investments in residential housing, manufacturing plants and other urban amenities due to lower land prices (Browder et al., 1995) and/or lack of sufficient space in the inner city or town. As a result, cities and towns expand outwards by including the immediate rural villages and their farmlands. Eventually, villages in peri-urban areas become dominantly urban and the adjacent rural villages becomes peri-urban which ultimately shifts the peri-urban areas outwards over time (Rakodi, 1999).

In the course of urban expansion, urban-driven social and economic structures are generally expected to be intensively installed on the then peripheries (Mattingly and Gregory, 2006). The economy shifts away from agriculture to industry and services.

Livelihoods of the preexisting farm communities are pressured to adjust to the industrial way of life in a very short period of time and migrants (mostly urban) dominate the local communities (Webster, 2002). But transition from the natural resource based production to cash and wage based economic systems is far from smooth because there might be household specific constraints that hinder integrating to the urban labor market. But discussions and analyses regarding livelihood transitions of farm households in peri-urban areas is scant in the literature.

Another issue related to urban expansion in sub-Saharan Africa is that the rapid change of socio-economic activities in peri-urban areas (Rakodi, 1999; Mbiba and Huchzermeyer, 2002). The dynamic change in the peri-urban has affected and will affect many smallholder farm households' welfare and livelihood. As the peri-urban shifts outward, it is noted that there exists threats to wellbeing and opportunities to improve livelihood of the farm household (Rakodi, 1999). The outward expansion of urban areas limits availability of farmland in peri-urban areas which again affects farm income of farm households in the locality. These farm households may intensify their nonfarm activity to shift their means of living and to diversify their livelihood strategies. But the nonfarm sector is a heterogeneous set of activities and necessitates country specific policies based on detailed analysis of the sector (Lanjouw et al., 2001).

The purpose of this study is, therefore, to investigate the effect of urban expansion on welfare and income diversification strategies of farm households in peri-urban areas in a sub-Saharan Africa context. Using a quasi-experimental ex-post impact evaluation approach, this study showed how urban expansion in Northern Ethiopia affects welfare of the farm households in peri-urban areas and how these farm households transform their means of livelihood. Applying rigorous econometric methods, it also identified the influential factors that contribute to welfare and income diversification strategies of the farm households in peri-urban areas.

1.2 Problem Statement

Governments in many developing countries develop urban expansion plans and design policies and strategies to create livable cities and promote sustainable urban

livelihoods. Such plans and policies influence the livelihoods (production and consumption) of subsistence farm households of the rural villages subsumed by the urban areas. However, the way in which these farm households respond to the policies as well as the nature and magnitude of linkages that exist between farm households' skills and urban labor market are crucial in determining the merits of the policies.

The literature on peri-urban sub-Saharan Africa, although limited, focuses on land use (Briggs and Mwamfupe, 2000; Kombe, 2005) and natural resource productivity and environment (Rakodi, 1999). The attention is more on the drivers of the peri-urban land use transformations and environmental issues. The other strand of literature mainly discusses theories and hypotheses of peri-urban development (for review see Adell, 1999; Mbiba and Huchzermeyer, 2002). Similarly, the empirical studies focus on the effect of peri-urban development on household income (Tadele, 1999; Mandere et al., 2010). However, empirical studies regarding the effect of urban expansion on peri-urban farm households' welfare and livelihood diversification dynamics are scarce in the literature. To fill this knowledge gap, this study examined the effects of urban expansion on welfare and income diversification strategies of peri-urban farmers in Tigray, Northern Ethiopia. Although the main focus is on Tigray, most of the conclusions can have a wider application to other regional states in Ethiopia and to other sub-Saharan Africa countries with similar urbanization patterns.

Ethiopia is among the poorest and least urbanized developing countries in sub-Saharan Africa and is recording high economic growth since end of 2000s. Urban areas of Ethiopia are expanding rapidly and the urban growth is very fast and exceptional. For instance, average annual urban population growth was 3.9% in 2007 (Bane and Alamu, 2012) which is above the expected two percent growth rate of urban Africa (Montgomery, 2008). This growth rate is expected to continue for some time in the future because urban Ethiopia is home to about one fifth of its people.

Urban areas in Ethiopia are expanding by including the pre-existing rural villages in peri-urban areas (PUAs). To satisfy the demand for urban land, inhabitants of the peri-urban villages are dispossessed from their farmlands. As a result, many farm

households have been forced to become urban residents by receiving financial compensation for the farmland (property) they are dispossessed of. These farmers cannot buy another plot of land to continue their farming activity because of land policy[2]. Ultimately these households are pressurized to shift their agriculture dominated activities to nonfarm activities in order to diversify their means, survive urban life and integrate into the urban economy. This process affects the farm households' welfare and livelihood strategies. Even though many farm households have been affected by this urban expansion process, little is known about its consequences. For instance, unanswered questions include: how do these farmers diversify their income portfolio; how do they integrate in the urban job-market and adapt to urban life; how do they utilize their land compensation. Moreover, analysis on the linkage between peri-urban farmers' skills and urban labor employment opportunities is scarce in Africa and in particular in Ethiopia. These issues initiated the motivation to investigate the effects of urban expansion on peri-urban farm households' asset holding, welfare dynamics, livelihood diversification and the mode of urban labor integration in Ethiopia.

1.3 Study Objectives

This study aims to investigate the effect of urban expansion and its associated policies on livelihood and welfare of farm households' in peri-urban areas. The focus lies on empirical investigation of the impact of urban expansion on: asset holding and welfare; income sources and diversification strategies; and resource (financial) utilization and urban labor market integration of farm households in peri-urban areas. This is done by: i) quantifying the effect of urbanization on welfare of the farm households in PUAs but within urban administrative boundary; and ii) identifying and comparing determinants of welfare and income diversification

[2] In Ethiopia, land is owned by the state and individuals have land user rights. They can lease it or transfer it to their siblings but they are not allowed to sell or mortgage it. Whenever a property (land) is expropriated for public development purposes, the proprietor receives compensation for the material loss suffered either in cash, in kind or both (FDRE, 2008). Moreover, land for investment (residential, industrial and commercial) purposes goes through public lease system which ranges from 30 to 99 years lease depending on the purpose of investment.

strategies of the farm households under urban administration with those under rural administration but within the boundary of PUAs. The specific objectives of the study are as follows:

1. To investigate the *meso* level effects of peri-urban transformation and how the farm households utilized their land compensation.
2. To examine the effect of urban expansion on welfare and asset holding of farm households in PUAs who are dispossessed from their farmland either partially or fully.
3. To investigate factors that influence consumption expenditure growth (welfare change) and change in subjective poverty status of farm households in the peri-urban areas; and to examine if the factors are different for farm households in the boundary of urban administration (rur-urban households)[3] and those under the rural administration (rural households)
4. To assess the households' participation in the urban labor market and to compare the results between rur-urban and rural households.
5. To examine income diversification strategies in peri-urban areas and to identify the determinant factors thereof; and investigate if the contributing factors are different for the rur-urban and the rural households.
6. To investigate the role of land compensation on welfare and income diversification strategies of the rur-urban farm households.

The above stated research objectives are addressed using quantitative data because they aim: i) to estimate the effect urban expansion on household welfare; and ii) to examine the relationships between welfare and income sources of the household's and the household's characteristics (i.e. demographic features and asset holding) and other external factors such as size of the local economy, land policy and shocks (i.e. weather, price and health). Household welfare was measured using objective and

[3] The term rur-urban is used to represent subsistence farm households living under urban administration. Full description is given in section 3.1, page 36, of this thesis.

subjective measures. Household consumption expenditure was used as a proxy to measure objective welfare (Dercon and Krishnan, 1998) and the subjective poverty of the households as perceived by the respondent of the household on scale basis was used to capture other components of household welfare such as health and education (Deaton and Zaidi, 2002).

Additionally, some of the objectives take in to account time-varying and unobserved fixed effects which cannot be easily observed such as the effects of size of the local economy and household preferences on welfare. Consequently, this study uses panel data for analysis to capture fixed effects and unobserved household heterogeneity. Moreover, models based on panel data have the potential to treat and capture unobserved individual specific effects.

1.4 Research Approach and the Study Area

To address the research objectives a peri-urban farm household livelihood diversification framework is developed adapting Reardon et al. (2007b) household's decision of diversification into nonfarm activities framework. The analysis is based on unitary household model. The household is the unit of analysis for this study. Household refers to all people, family as well as non-family, who live in the same house and share the same resources. This definition is commonly used in conducting census in Ethiopia and culturally representative in the study area (CSA, 2008). Econometric estimations methods are carried out to investigate the impact of urbanization on welfare and vulnerability and to identify factors that influence income diversification strategies of peri-urban farm household. The peri-urban – rural welfare, vulnerability and livelihood linkages are analyzed at micro level. In doing so, this study provides microeconomic evidence on urban-peri-urban livelihood diversification strategy linkages.

Analysis of this study is mainly based on ex-post panel dataset collected from a survey conducted in eight districts of Tigray Regional State, Northern Ethiopia. The data were collected from a sample of same households for two consecutive periods based on a structured questionnaire. Chapter 3, of this thesis, presents the details on sampling strategy, questionnaire development and description of the study area.

Secondary data were used to review the background information of the study area. The secondary data were collected from different government offices such as the Central Statistics Agency of Ethiopia (CSA, 1999; 2007b; 2008; 2010b; 2010a; 2011a; 2011b); the Ministry of Finance and Development of Ethiopia ((MoFED, 2006; 2010; 2011; 2012); the Bureau of Finance and Plan of Tigray Regional State (BoFP, 2007; 2010a; 2010b; 2011b; 2011a) and from the respective urban administrations.

1.5 Structure of the Thesis

The thesis contains eight chapters including the introductory chapter. Chapter two presents the literature on peri-urbanization in the context of developing countries and the implications for the subsistence farm households in peri-urban areas. Drawing from the literature an analytical framework to guide the analysis is also presented in this chapter.

Chapter three is devoted to discussions on the methodological approach adopted. This chapter presents the relevance of adopting an *ex-post* quantitative impact assessment for the analysis. Additionally, the chapter provides a description of the sampling strategy and the selected survey sites used to carry out the research.

Chapter four describes the peri-urbanization situations of Ethiopia and Tigray Regional State to acquaint the reader with the area under study. It includes a general overview of the peri-urbanization development of Ethiopia and Tigray Regional State's economic performance and urban expansion trends. Additionally, the chapter presents preliminary results of the survey data on household welfare, employment options and utilizations of the land compensation money.

In chapter five the effects of peri-urbanization on welfare and asset holding of farm households in peri-urban areas is analyzed. The effect of urbanization on household welfare is conceptualized using an ex-post impact evaluation framework. Urbanization is considered as equivalent to any social programmes targeted at the peri-urban farm households. The outcome of the intervention is represented by the household's *ex-post* welfare and asset holdings. The average opportunity benefit or

cost of urban expansion, expressed in terms of household consumption expenditure, is estimated using "matching methods".

Chapter six analyses the factors associated with welfare and vulnerability of the peri-urban farm households. Two different measures of household welfare are employed - subjective and objective. The objective (or money-metric) measure used real household consumption expenditure as a proxy to the "*Permanent Income Hypothesis*". Adapting Mankiw et al. (1992) framework, consumption growth model is developed at household level. Hausman and Taylor (1981) estimation model is applied to identify the factors that affect consumption growth of the household. The subjective welfare indicator is defined on the basis of the poverty level of the households as perceived by the household itself. Consequently, a multinomial logit model is used to identify factors that affect the change in subjective welfare of the household.

Chapter seven is devoted to an examination of income sources and diversification strategies of the farm households in peri-urban area. Maddala's (1983) random utility model was applied to analyze the factors that influence the household's decision to adopt a specific livelihood diversification strategy. This model takes into account different factors, household as well as location specific, that likely affect the household's decision of adopting one diversification strategy over another. Household decisions were assumed to be independent and mutually exclusive. Accordingly, multinomial logit is applied to identify the factors that affect the household's choice of specific livelihood diversification strategy relative to the others.

Finally, in chapter eight key findings of the analyses are discussed. Conclusions, policy implications of the findings and issues for further research are also presented in this chapter.

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

This chapter focuses on theories and concepts of peri-urban areas and peri-urban development in the context of developing countries. It discusses the various perceptions of peri-urban development and the implications for farm households in peri-urban areas. In describing these issues, the chapter reviews the studies conducted on the effects of peri-urban development in the context of sub-Saharan Africa and identifies the knowledge gap in the literature. Emphasizing the scarcity of knowledge, the chapter also discusses theories of household livelihood diversification strategies and describes consequently the conceptual framework for peri-urban farm households' income diversification strategies drawing from Reardon et al.'s (2007b) diversification framework.

2.2 Peri-urban Areas: Review of the Definitions

The term "peri-urban" has different definitions and conceptions depending on the intensity of land use patterns, type of economic activity and social characteristics of the inhabitants[4]. Different studies use different terms to refer to a similar location, such as urban fringe, urban periphery, suburb, etc. Moreover, there is no uniform characterization of peri-urban areas (PUAs). Some studies define peri-urban in terms of distance from the city while others characterize peri-urban in terms of land use. For instance, in the context of Sub-Saharan Africa, PUAs are defined within the radius of 30 – 50 kilometers from the city (Simon et al., 2004). But this distance may extend up to 300 kilometers in the case of "Extended Metropolitan Regions" of East Asian countries (Webster, 2002). PUAs are also characterized as the dynamic transitional space between urban and rural hinterland (Simon, 2008; Zasada et al., 2011). Even if the spatial characterizations of PUAs are quite similar, the differences

[4]See Adell (1999) for analytical review of definitions, evolution and development models of peri-urban interface studies conducted in the 1990s.

are more pronounced when PUAs are characterized in the context of regional economies or global locations such as developing versus developed countries.

In the context of western (developed) countries, where division of rural-urban areas is less important, peri-urban areas (PUAs) are characterized as an integral part of the urban system in terms of functions and planning (Simon, 2008). Likewise, the notion "peri-urbanization" is employed to express peri-urban development to urban proper (Zasada et al., 2011). Whereas in the context of the rapidly urbanizing developing countries, where the distinction between urban and rural areas is still vital, PUAs are defined as the "dynamic transitional zone" between urban and the immediate rural both "spatially", i.e. refers to the land use and "structurally", i.e. refers to the economic activities (Rakodi, 1999; Simon, 2008). From this, it is clear that the economic activities in PUAs are likely to depend on the type of investments undertaken in these areas and shaped by the nature of activities in the respective city/town.

PUAs in Southeast and East Asia are shaped by the extended metropolitan urbanization (e.g. Manila, Bangkok, and Chengdu cities) where extensive industrialization plays a decisive role (Webster, 2002; Webster and Muller, 2002; Simon, 2008). Unlike cities in Asia, cities in Africa are growing rapidly without experiencing substantial industrialization as a result creating widespread PUAs (Simon, 2008; Jedwab, 2012; Henderson et al., 2013). PUAs in Africa are generally described as dynamic transitional zones between rural and urban areas and shift outwards over time (Phillips et al., 1999; Rakodi, 1999; Simon, 2008).

Adell (1999) notes the presence of non-uniform conceptualizations and definitions of PUAs in most studies conducted in 1990s in Africa. The definitions of PUAs in Africa are mostly specific to the outcome of interest (Phillips et al., 1999; Mbiba and Huchzermeyer, 2002). Similarly, Simon (2008) notes that the absence of the concepts of PUAs in the languages of many developing countries which in turn makes conducting inter-country or inter-regional comparisons of PUAs difficult. Hence, development policies that focus on PUAs should consider the specifics and peculiarities of the urban centers and the region (Tacoli, 1998). Due to the aforementioned reasons, this study adopted Rakodi's (1999) description of PUAs. Rakodi describes PUAs in the following way:

> *The peri-urban interface is a dynamic zone both spatially and structurally. Spatially it is a transition zone between fully urbanized land in cities and areas predominantly agricultural use. It is characterized by mixed land uses and indeterminate inner and outer boundaries, and typically is split between administrative areas. The land areas which can be categorized as PUA shifts overtime as the city expands. It is a zone of rapid economic and social structural changes, characterized by pressures on natural resources, changing labour market opportunities and constraints and changing patterns of land use (Rakodi, 1999: 2).*

This definition indicates the presence of swift changes of livelihoods - from natural resource-based to urban dominated activities- and land use in PUAs. However, the line that divides between urban and peri-urban, or peri-urban and rural is still blurred and the same is true regarding the distinction between inner and outer boundaries of PUAs. Even if PUAs are considered as dynamic transitional zones between the urban proper and rural country side, having criteria to delimit the boundaries and distinguish the features among them may help to understand the short-term, medium-term and long-term effects of urban expansion.

Peri-urban areas in this thesis are described as: i) dynamic transitional zones between the city/town and the rural countryside; ii) composed of urban and rural features with inner and outer boundaries where the inner boundary represents the pre-existing villages incorporated in the urban administration due to urban expansion and the outer boundary stands for the adjoining rural villages; and iii) being under increasing pressure and highly influenced by the city (town) activities then ultimately becoming predominantly urban. The fundamental difference between the inner and outer boundaries of PUAs is in terms of access to farmland and development planning systems. The inner boundary has limited access to farmland and is officially under urban development planning while the outer boundary has better access to farmland and is officially under rural development planning.

2.3 Peri-Urbanization: Concepts and Theories

2.3.1 Definition of Peri-urbanization

Development of PUAs, meaning changing these areas to urban environments, has diversified definitions and conceptualizations. Different terms exist in the literature to represent the development of PUAs such as *peri-urbanization*, *sub-urbanization*, *counter-urbanization* and the like. *Sub-urbanization* is the process where the proportion of population living in the suburbs rises (Sridhar, 2007). *Counter-urbanization*, mainly observed in industrialized countries, refers to urban dispersal into the rural areas due to reverse migration from the city to the countryside (Champion and Waters, 1991 as cited in Adell, 1999). *Peri-urbanization*, in the context of European countries, refers to every zone external to the city that surrounds it but which are separated by important discontinuities of the urban element and is the outcome of outward dispersal of urban activities, essentially residential ones (Adell, 1999).

Correspondingly, Webster and Muller (2002) characterize peri-urbanization in the context of China as: i) the changing of land use patterns from predominantly agricultural land to industrial use and other urban purposes which results in rising land prices; ii) the shifting of the economic structure from an agriculture-based to a manufacturing-dominated economy and the local labour employment structure accordingly; and iii) rapid population growth of the locality. Generally, peri-urbanization can be defined as the dynamic process where the PUAs become urban in character such as in physical, social and economic terms (Webster and Muller, 2002; Webster et al., 2004). From the preceding descriptions, therefore, peri-urbanization can be better understood as the urbanization process of the peri-urban areas.

Urbanization, generally, is demographically defined as the share of urban population (Cohen, 2006; Satterthwaite et al., 2010). However, the criteria used to classify a settlement as urban substantially vary among countries (e.g. see Davis and Henderson, 2003; Cohen, 2006; Satterthwaite, 2010). An urban settlement can be defined in various ways using population, administrative or political boundary which in turn creates disparity in comparing an urban settlement in one country with another country (Cohen, 2006).

Given the absence of standard criteria to classify a settlement as urban globally, urbanization is considered as the outcome of structural transformation and an important feature of economic development. Davis and Henderson describe urbanization as follows:

> *Urbanization occurs as the country shifts from agricultural activity into urban-industrial activity; is a transitory phenomenon; … is poorly measured because the definition of urban varies from region to region; … is modestly affected by government policies and institutions (Davis and Henderson, 2003: 99).*

This characterization asserts that urbanization happens when labour employment of the nation shifts from agriculture sector to non-agriculture sector which means allocation of resources such as labour and land out of agriculture. This is known as the process of structural transformation, meaning a decrease in the share of agriculture in Gross Domestic Product (GDP) and employment accompanied by a long term increase in income per capita (Kuznets, 1966 cited in Alvarez-Cuadrado and Poschke, 2011).

2.3.2 Structural Transformation and Urbanization in Africa

The classical theories of structural transformation distinguish "*labour pull*" and "*labour push*" factors as the key drivers of urbanization or rural-urban transition (Alvarez-Cuadrado and Poschke, 2011). Both "*labour pull*" and "*labour push*" theories are based on productivity advantages of the two sectors, mainly urban-based industry and agriculture, of the economy. Proponents of the "*labour push*" hypothesis argue that growth in agricultural productivity is essential to achieve structural change (e.g. see Gollin et al., 2002; Gollin et al., 2007). The presumption is that growth of agricultural productivity releases resources to the industrial sector and accelerates the start of industrialization.

On the other hand, the "*labour pull*" theory argues that higher productivity in the industrial (non-agricultural) sector attracts the unemployed and underemployed labour from the agricultural sector (Lewis, 1954; Harris and Todaro, 1970). This theory suggests that the productivity growth of the non-agricultural sector raises urban wages and then it creates difference in wage between industrial and

agricultural sector as a result. Hence, this growth attracts labour from the agricultural sectors which increases the proportion of non-agricultural employment of the working labour force and eventually drives the structural change. Both theories of structural transformation can best explain the urbanization process accompanied by structural transformation which portrays the development paths of North America, Europe and some countries in Asia (e.g. Jedwab, 2012; Michaels et al., 2012; Henderson et al., 2013).

On the other hand, urbanization in many developing countries might not follow similar paths to that of the developed countries. For instance, peri-urban development in China is the result of investments on the manufacturing sector due to deliberate dispersal of state-owned industries, foreign direct investments and domestic investments (Webster and Muller, 2002; Webster et al., 2004; Simon, 2008). This indicates that China's peri-urban development is also the result of institutional arrangements, i.e. the government's role in locating the manufacturing sectors, and global trade shocks (Herrendorf et al., 2013) other than the simple "*labour pull*" or "*labour push*" theories.

The rapid urbanization in Africa, however, seems to follow a different path. Urbanization in SSA is not the result of "green revolution", meaning productivity of agriculture, because food production has remained low (Jedwab, 2012). Similarly, it is not due to "industrial revolution", meaning productivity of manufacturing, because the manufacturing and service sectors are small and inefficient (Jedwab, 2012; Henderson et al., 2013). Nor it is due to institutional arrangements because institutions are either ineffective or absent. Moreover, urban areas in Africa have been expanding without substantial investments in industrialization (Simon, 2008) and against the backdrop of economic growth particularly in the 1990's (Fay and Opal, 2000; Henderson, 2003; Cohen, 2004; 2006). On the other hand, evidences indicate that, between 1970 and 2010, the share of urban population of Sub-Saharan Africa (SSA) has grown at a higher rate than the other developing countries. For instance, urban population growth rate was 2.09% per annum for SSA while it was 1.29% for the other developing countries during the same period (Henderson et al., 2013). The issue then is what causes this rapid urbanization in SSA and what are the effects at micro and macro level.

What caused the rapid urbanization in SSA is still an unresolved issue and needs considerable debate. Recently, some studies highlight urban growth in SSA is due to the export of natural resources (Gollin et al., 2012; Jedwab, 2012). Others argue that urbanization in SSA is due to human capital accumulation or in their words "efficiency of technology" (Henderson et al., 2013). These studies are concerned with what causes urbanization or structural transformation at macro level. But Kuznets (1955) indicates that, at the early stages of development, urbanization and economic growth are accompanied by raising income inequality. This signals that the poor gain little at the early stages of economic growth or urbanization which becomes worse in cases where urbanization outpaces economic development.

In fact, Black and Henderson (1999) indicate the scenarios where urbanization can nurture income inequality among initially similar families, i.e. in their own words "identical dynasties". This notion supports the claim that the current urbanization in developing countries is contributing to urban problems and increasing urban poverty. Likewise, Henderson (2002) argues that urbanization challenges are greater for developing countries compared to developed countries because the learning time for the agents in the economy, i.e. the political and economic institutions and the markets, is shorter. Additionally, Henderson (2002: 90) points out that the rapid urbanization in developing countries leaves little space for the rural societies and institutions to acclimatize themselves to the urban systems.

It is clear that urbanization in many developing countries is: caused mostly by natural growth; happening partly due to development of new urban settlements; and inclusion of pre-existing rural settlements in urban ones (Cohen, 2006). Similarly, urban expansion in developing countries is generally land-intensive due to land price speculators and poor urban planning (UNFPA, 2007). This means that the conversion of farmland to urban use is greater in developing countries compared to the developed ones. On the other hand, livelihood environments are less complex in rural areas and more complex and diverse in urban areas (Meikle et al., 2001; Rakodi, 2002). Despite these issues, urbanization in developing countries, in general, is expected to continue rapidly in the foreseeable future and the level of urbanization is expected to increase from 47% in 2011 to 64% in 2050 (United-Nations, 2011).

All the above mentioned issues have vital implications for the farm households in pre-existing rural villages of the peri-urban areas for at least three reasons. Firstly, inhabitants of these villages are shifting from natural resource-based to finance-based livelihoods in a very short period of time due to an external factor, i.e. urbanization. Secondly, they are moving from a relatively easier livelihood environment to a more complex and diverse one and are probably not ready for such kind of change. The other reason is that they are the most affected by the short period of time to adjust into urban-based employment opportunities as well as to learn an urban way of living. This in turn influences their welfare and income diversification strategies in order to make a viable living in the future.

2.4 Effects of Peri-Urbanization in Sub-Saharan Africa: Overview of the Literature

The extensive nature of urban expansion in sub-Saharan Africa in particular, and developing countries in general, can have positive and negative effects on multiple aspects (such as environmental, social and economic) of the farm households in the PUAs. A significant number of studies have investigated the environmental issues (for a comprehensive review see Simon, 2008). A number of studies have investigated the effect of urbanization on the livelihood of farmers in PUAs (Gregory and Mattingly, 2009; Mattingly, 2009; Oduro, 2010) and farmers sources of income in PUAs (e.g. see Lanjouw et al., 2001; Mandere et al., 2010; Kasa et al., 2012).

Gregory and Mattingly (2009) identify agriculture as the key source of livelihood for the farmers in PUAs although availability of land is being reduced[5]. By reviewing

[5] According to Gregory and Mattingly (2009), over 25 studies have been conducted on the peri-urban inhabitants of the three cities (Hubli-Dharward and Kolkata in India and Kumasi in Ghana) sponsored by the Natural Resources Systems Program (*NRSP)* project based in Britain. Their studies are based on the synthesis of outputs of the different reports under the same project. In fact, Mattingly (2009) acknowledges that the rationale for selecting survey sites is not accessible and the findings are examples of what can happen in the peri-urban areas. Interested readers can access the different reports on http://www.nrsp.org/database/documents/

the different reports of the Natural Resources Systems Program (NRSP) project, Mattingly (2009) suggests the possible policy interventions, such as access to credit and provision of training, which might address the hurdles associated to the rural-urban livelihood transition. Both studies use the same data sources. However, important methodological issues are missing from the reports, such as the rationale why these particular PUAs are selected and how the training beneficiaries were selected which in itself is a potential source of bias. These studies may provide examples of the peri-urban farmers' livelihood transition but it could be difficult to extrapolate the findings to a wider population for the aforementioned reasons.

Similarly, a study from the peri-urban areas of Accra, Ghana presents the changes in livelihood assets. Oduro (2010) applied a qualitative research approach to explore the effects of peri-urban development on the livelihoods in PUAs of Accra, Ghana. Oduro's findings suggest that peri-urbanization changes employment opportunities of the peri-urban communities and livelihood diversification is a norm. Moreover, Oduro highlights that the different land tenure systems cause different livelihood outcomes, i.e. in terms of benefiting from the new employment opportunities. However, this scenario is questionable in cases where land tenure security is the same to all the farm households. Given the same land tenure security, the farm households can have different livelihood outcomes is likely due to differential access to assets other than land. It is also likely that the pre-existing farm households adopt different livelihood diversification strategies to diversify their income sources in order to cope up with the dynamics of rural-urban livelihood transitions and to accumulate wealth.

Farm households in PUAs diversify their income sources in order to spread the risk of falling agricultural income and to gain adequate incomes (Simon, 2008). Findings from peri-urban Tanzania suggest that nonfarm activities are significant sources of the farm household's income (Lanjouw et al., 2001), i.e. the income share constitutes about 24% of the total household income. In peri-urban Nyahururu, Kenya, farm households earn 50% of their income from nonfarm sources (Mandere et al., 2010). Likewise, Kasa et al. (2012) suggest that farm households in peri-urban Addis Ababa, Ethiopia derive their income from different sources such as agriculture, industry and services.

These studies concur with the idea that income sources of farm households in peri-urban areas are more diversified to nonfarm activities than those in the country side (Lanjouw et al., 2001; Fafchamps and Shilpi, 2003). However, the household employs strategies that depend on the household's portfolios and capabilities to find and make use of employment opportunities (Rakodi, 2002). This signals the presence of differences among the subsistence farm households within the community in accessing the nonfarm sector. It is also likely that land related policies can have differential effects on farm households in PUAs in the course of in-migration, i.e. migration without displacement, from rural to urban economy (Gregory and Mattingly, 2009).

In general, the literature indicates that livelihoods in the PUAs of the SSA are more diversified compared to their rural counterparts and the subsistence farm households in PUAs become vulnerable because they are unable to exploit the new employment opportunities in these areas. However, it is likely that one farm household is different from the other in terms of asset holding and resilience which in turn leads to differential effects. This suggests a gap in the knowledge on the differential effects of urbanization on farm households in PUAs and the factors that likely influence the effects. Moreover, Simon (2008) highlights the dearth of information on the social and economic issues of peri-urban areas and Mandere et al. (2010) also share the same concern. This clearly indicates the scarcity of knowledge on the effect of urbanization at micro level specifically on welfare and livelihood diversification strategies of the farm households in PUAs.

2.5 Farm Household Livelihood Diversification Strategies

The literature on conceptual and empirical issues of livelihood diversification strategies is extensively concerned with rural households (e.g. see Scoones, 1998; Ellis, 2000; Barrett et al., 2000; Reardon et al., 2000; Reardon et al., 2007b). Apart from Scoones' (1998), the other authors deal with one component of the livelihood strategy, i.e. livelihood diversification. Scoones has identified three livelihood strategies such as agricultural intensification (or extensification), livelihood diversification and migration. The first strategy is farm activity aimed at improving

farm productivity by applying more capital-led inputs (or more labour-led inputs)[6]. This is a strategy where availability of land (farmland) is likely a condition. Livelihood diversification is described as the choice of investments aiming at either asset accumulation or diversification to cope with temporary or permanent adversities of an existing livelihood. Migration is moving away, either permanently or temporarily, to seek a new livelihood due to voluntary or involuntary factors.

The farm households in peri-urban areas, however, are in a state of transition from natural resource-based livelihoods to cash-based livelihoods. In order to adapt and integrate into the urban economy, the peri-urban farmers might manage to support their means of living by devising different survival or asset accumulation strategies. In contexts like this, agricultural intensification (extensification) as a livelihood strategy could be less feasible since access to farmland is limited. But the farm households' skills in the rural nonfarm sector - such as carpenter, masonry, petty trading and the like - might serve as an entry point to the urban labour market. Moreover, labour and housing are the most important assets of the poor in the context of urban economy (Moser, 1998).

The literature classifies income sources of rural households into on-farm, off-farm and nonfarm (Ellis, 2000). According to Ellis, on-farm income consists of income earned from own cultivated land and livestock. Off-farm income is an income generated from primary sector production systems similar to on-farm but away from one's own farm and includes income from extraction of natural resources (e.g. collecting sand and stone mining, firewood, wild fruit, etc.). Nonfarm income is non-agricultural income generated from secondary and tertiary sector production processes. Unearned income, also known as transfer income, is part of nonfarm income which consists of income generated from remittances, gifts, rents, pensions, social transfers, etc. In this notion, Ellis's characterization of the nonfarm sector is comparable to livelihood diversification strategy described by Scoones (1998).

[6] Capital-led inputs refer to applying inputs that reduce labour input and improve soil fertility while labour-led inputs refers to using more labour or sometimes more land in the production system (Scoones, 1998).

Farm households' usually adapt livelihood diversification strategies either because of *necessity* or *choice*[7] reasons (Ellis, 2000). According to Ellis, *necessity* reasons refers to when diversification occurs as a result of events outside the household's control such as when the family is evicted from access to land, due to land fragmentation, environmental degradation, etc. Whereas *choice* reasons to diversify refers to when the household diversifies voluntarily into a varying income sources such as considering new employment opportunities, investing on new ventures, improving the existing ones, etc. In both cases, livelihood diversification depends on the households' possession of human capital (education, skill, labour and health) and physical assets (land, livestock, infrastructure, and money), gender and available employment options.

The way households diversify their asset portfolios and income sources can make the households vulnerable to the changing economic environments. According to Moser (1998), the households' ability to reduce vulnerability depends on their initial asset and ability to transform those assets into income and other basic necessities. Although urban expansion is not a sudden event to peri-urban farm households, the process disrupts the usual income source of these households and pressurizes them to fundamentally change their means of living as a result. This implies that farm households' responsiveness and resilience to the dynamic socio-economic environment can have effects on their livelihoods[8].

The outcomes of the changes in the peri-urban areas may not always be positive and the nature of the transformation could be contentious (Mbiba and Huchzermeyer, 2002). This, in turn, calls for area specific detailed analysis. For instance, in peri-urban Ethiopia, some farm households are combining both the natural resource based production and wage livelihoods. But when their biggest asset (farmland) is converted into cash, these farmers might utilize their resources to diversify their

[7] As cited in Ellis (2000a), necessity and choice reasons also contrast between survival and choice (Davies, 1996) or between survival and accumulation (Hart, 1994) but corresponds to push versus pull reasons to migrate (e.g. Bigsten, 1996) in the migration literature.

[8] Negative livelihood adaptation occurs when households are forced to adapt to and unable to cope with the shock and need basically change the means to support their living (Davies and Hossain, 1997).

income portfolio and to integrate into an urban economy. However, the nonfarm activities are far from homogenous (Lanjouw et al., 2001) and examining the composition of livelihood portfolios of these farm households is interesting in its own right.

The transition process from the farm dominated economy to the cash and wage economy is far from smooth. The livelihood transition could be easy for some households and might not be for others. This definitely results in differential effects on household livelihood diversification strategies as well as the levels of adaptation to the urban life which necessitates detailed empirical investigation at micro level. Hence, investigating the factors that influence the differential effects is important to recommend alternative development schemes that can foster the productive capacity of the peri-urban farm households. To address these issues, a conceptual framework is developed in the next section to analyze the effects of urbanization on welfare and income diversification strategies of the farm households in peri-urban areas.

2.6 Farm households Income Diversification Strategies and Welfare in Peri-urban Areas

It is clear that farm households located on the outskirts of the urban centers face the risk of losing their farmland. Land is a very important and scarce asset to these households and can be considered as a safety net asset especially to the poor and marginalized. However, this land is partially or fully gone forever as a result of urban driven development processes and changes its form to financial assets due to emerging new land prices. For instance in Ethiopia, farm households are entitled to receive financial compensation for the property they are dispossessed of (FDRE, 2005). Consequently, these farm households have to diversify their income portfolio in the nonfarm sector to make a living. This implies that these households have to adapt livelihood diversification, migration or both as strategies to survive and/or to accumulate asset. Given the limited access to land, they may: i) possibly engage in new multiple nonfarm activities; ii) use their nonfarm skills to diversify their livelihoods; iii) apply migration as a strategy; or iv) use a combination of the above to support their livelihood.

Once the farmers in PUAs are dispossessed of their farmland or have limited access to farmland, they might make a series of decisions and choices in order to survive and adapt living in the urban economy and secure their means of income. Like the farm sector, undertaking nonfarm activities needs investing in assets specific to the activity (Reardon et al., 2000). The households' capacity and the incentives to invest affect the households' decisions to engage in nonfarm activities (Reardon et al., 2000).

The capacity and incentives to invest are largely shaped by factors specific to the household and the local economy (Reardon et al., 2000; Reardon et al., 2007b). The common assumption in the literature is that households (individuals) make rational decisions to maximize their benefit and minimize risk. Based on this assumption, Reardon et al. (2007b) develop a conceptual framework of "*why rural households' diversify into the rural nonfarm activities*" and is reproduced as follows:

> *The determined variable is diversification in to nonfarm activity through labor supply and capital investment decisions. The diversification choice can be broken down into five interdependent and simultaneous choices regarding the following:*
>
> - *Nonfarm participation: choice of farm activity versus nonfarm activity*
> - *Level of nonfarm activity*
> - *Sectoral choice within the rural nonfarm economy: manufacturing versus services*
> - *Location: whether to undertake the activity in the locality or elsewhere via migration*
> - *Form: whether to undertake self-employment or wage employment*
>
> *On the other hand, there are three determinants of those choices:*
>
> - *The set of incentives "levels" facing the household, including relative prices of outputs and inputs to activity j versus activities k, l and m*
> - *The instability of incentives: the set of incentives "variations" facing the household, including the relative risk (climate, market, and other risks) of activity j versus activities k, l and m*
> - *The set of capacity variables (capital assets including human, social, financial, organizational, and physical assets that enable the undertaking of the activity) (Haggablade et al., 2007: p116-117).*

This framework is developed using the household's utility maximization model subject to market and credit constraints and focuses on the household's labour supply and capital investment decisions in the rural nonfarm sector. Accordingly, Reardon et al. (2007b) have identified five simultaneous choice decisions (i.e. participation, level, sector, location and form of employment) and three determinants (i.e. incentive level, instability of incentives and capacity variables) of the choices. This framework is developed when farm households try to allocate their resources at their own will. However, in addition to market and credit constraints, farm households in peri-urban area have limited access to farmland and face urban-induced livelihood transitions. These constraints might have differential effects on the households' decision which depends on factors specific to the households and the local economy.

Depending on the urban labour market and households' possession of resources (wealth, labour, skill, education, finance, and health), peri-urban farm households might made different inter-dependent choices and decisions regarding the sector, level and form of activity. Some households might decide to seek new employment opportunities and engage in sectors such as either in construction, trade, manufacturing, service or a combination of them. Other households might choose to enhance their previous experience in nonfarm activities. Then, sector choice may be followed by choice on level of the enterprise such as micro, small or medium enterprises. Naturally, small and medium enterprises require high initial stocks of human, financial and physical capital compared to micro enterprises. Enterprise level decisions could be followed by choice of form of employment that is either waged employment or self-employment. An overview of how the peri-urbanization affects the livelihoods of farm households in the peri-urban areas is depicted in Figure 2.1. Underlying this framework, the hypotheses are:

i) Peri-urbanization transforms the peri-urban area from the natural resource-based livelihoods to cash-based livelihoods by changing the physical, social and economic aspects of the pre-existing farming communities.
ii) Given the common external factors, e.g. land policy and incomplete market for labor and credit, peri-urbanization leads to differential effects on welfare and asset holding of the pre-existing farm households.

iii) Different factors influence the welfare and vulnerability of the farm households who have limited access to farmland and those who have not.
iv) The size of the local economy and the household's asset ownership play important roles in the farm household's income diversification decisions.
v) The farm household's decisions to invest or engage in specific income generating activities affect the household's welfare, asset holding and livelihood outcomes.

These hypotheses are examined in the empirical chapters, chapter four to seven, of this thesis. The first hypothesis is addressed in chapter four. The second hypothesis is examined in chapter five. Chapter six is devoted the third hypothesis. The last two hypotheses are investigated in chapter seven. Before moving to the empirical analysis, the methodology applied is presented next.

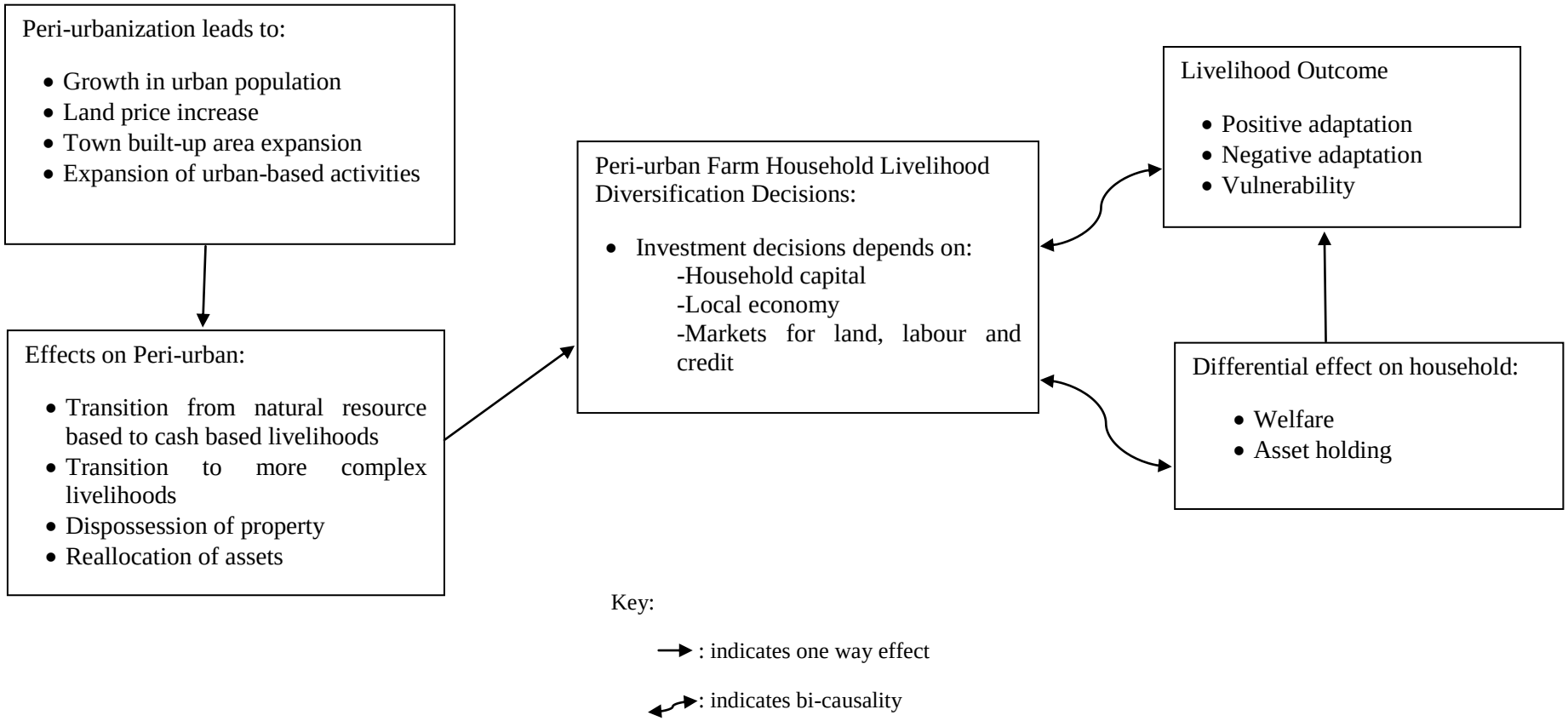

Figure 2.1: Urbanization effects on farm households' livelihood diversification in PUAs

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The main purpose of this chapter is to present and defend the research methodology adopted for the study. First a brief reiteration of the research issue is presented to explain the choice of methodology. Section 3.3 presents the relevance and importance of adopting a *quantitative impact assessment* approach to answer the research objectives of this study. The process followed to develop the survey instrument, meaning the structured questionnaire, is provided in section 3.4. Section 3.5 presented the sampling framework used, the rationale behind for selecting the sites for survey and brief description of the selected sites. Detailed descriptions of the sample drawn from each survey site and the survey data collection process are presented in section 3.6 and 3.7, respectively. A brief summary of the empirical methods applied to analyze the primary data is presented in section 3.8 and the last section provides conclusion.

3.2 The Research Issue

There is a common view that the urban expansion trend in many developing countries is likely to increase urban poverty. Urban expansion, particularly in these developing countries, is happening by taking up the farmlands and including the pre-existing villages of subsistence farm households in the peri-urban areas (Cohen, 2004; 2006; Gregory and Mattingly, 2009). The production and consumption behaviours of these farm households eventually changes from predominantly rural to urban as a result. Thus livelihoods in urban peripheries become less dependent on natural resources and shifts to urban-base labour employment over time. Transitions from rural to urban lives is far from smooth where some farm households might possibly experience difficulties and become vulnerable while others adapt well or stay the same. The differential effects might be caused by factors which are specific to the household, the community and/or policies and factors at a macro level.

What causes the differential effects? How do farm households diversify their income sources in the urban labour market and why? These issues are the fundamental

concerns of this thesis and form the basis of the research objectives underpinning this study. By investigating these issues, the thesis aims to recommend alternative policy options, based on the knowledge gained in order to foster the productive capacity of the farm households in peri-urban areas.

As discussed in the previous chapter, the definition of peri-urban areas (PUAs) is disputable and the term itself is absent in the languages of most developing countries (Simon, 2008). In addition to this, the dichotomous - rural and urban - location classifications are prevalent and employed by most developing countries, which is true in the case of Ethiopia. For the sake of clarity, in this study PUAs refers to the pre-existing rural villages including their resources, on average, within a radius of 15 kilometers from the boundary of the built up areas of a town. This definition is convenient for PUAs of towns with a population range of 20,000 to 250,000. It is also suitable to examine the effects of urbanization on welfare and income diversification strategies of farm households in PUAs of all towns in Tigray and most towns in Ethiopia. But it should be noted that the boundary frontier is fluid because built up areas of the towns obviously expand over time and unevenly.

3.3 Methodological Approach

The literature classifies research methodology, generally, into three such as quantitative, qualitative and mixed methods (e.g. see Creswell, 2009). According to Creswell (2009), a quantitative approach is suitable when the problem at hand calls for identification of variables that affect an outcome and the best predictors of an outcome. Similarly, Creswell argues that the qualitative approach is appropriate when the objective of the problem is exploring and understanding a situation. However, "*the complementary nature of quantitative and qualitative approaches*" helps the researcher to adopt both approaches as a sequential process or for triangulation purposes (Thietart, 2001). For instance, group discussions and in-depth interviews are generally employed to devise and calibrate instruments to incorporate in structured questionnaire (Walker, 1985 as cited in Thietart, 2001). In this case, a qualitative approach is serving as a necessary and important stage in a basically quantitative approach.

As stated previously, the main objective of this study generally is to quantify the effect of urbanization and associated policies on PUA farm households' welfare and to identify the main contributing factors that influence the outcomes, i.e. household welfare and livelihood diversification strategies. Accordingly, this thesis adopts a quantitative research approach to collect the primary data for analysis. The researcher has also employed a qualitative approach at the early stages of the study to supplement the quantitative approach. By analyzing the impact of urban expansion, this thesis addressed the question "what would have happened to the farm households in PUAs without urbanization?" adding further emphasis to its focus on policy impacts. Hence, methodologically the thesis follows an *impact evaluation* method which is part of the *quantitative impact assessment approach*.

Impact evaluation of an intervention - also known as non-experimental, social experiment or quasi-experimental evaluation - can be done by adopting ex-ante or ex-post evaluation methods (Khandker et al., 2010: p20). This thesis focuses on investigating the effects of urbanization after implementation (i.e. ex-post). Hence, the methodological issues of this thesis, such as the research design, development and process are influenced by Ravallion's (2007) review of ex-post impact assessment methods. However, it is well documented that the challenge in this approach is to determine "*what would have happened to programme participants without the programme*", i.e. referred as *counterfactuals*[9], which cannot be observed (see for instance Ravallion, 2007; Khandker et al., 2010). The general practice to fill this gap is to collect data from non-beneficiaries of the programme, known as a comparison group, in order to generate "*the counterfactual data*" (Wooldridge, 2002; Cameron and Trivedi, 2005; Ravallion, 2007; Khandker et al., 2010). But finding a "convincing and reasonable" comparison group is another challenge in itself which requires having adequate knowledge about the programme beneficiaries and non-beneficiaries.

In this study, urban expansion is assumed as an intervention imposed on PUAs by external factors and affects the whole population of the affected rural village. When an intervention affects the entire population of a targeted area, the comparison

[9] Counterfactual is a hypothetical situation assumed to prevail for an individual or a household in the absence of the programme.

group[10] has to be drawn from a different location that is not targeted by the intervention and should have similar features to the beneficiaries before the intervention (Abadie et al., 2010). Sometimes programme beneficiaries and non-beneficiaries could possibly come from two different economic and social environments. Situations like these could make it difficult to create a genuine comparable group which is a typical challenge in conducting non-experimental ex-post evaluations. For cases like this, it is recommended that to collect recall data by asking retrospective questions on specific variables before the start of the programme (Ravallion and Chen, 2005; Chen et al., 2006b; Ravallion, 2007).

The recall data, collected on the specific variables, has the advantage of being able to follow the household or individual over time and these variables are known as "lighter instrumental variables" (Ravallion, 2007). However, it is important to treat reliability of the data with caution because ability to recall and length of the recall period are important issues to consider in such exercises. There are cases where combining cross-sectional data and lighter instrumental variables are not sufficient to capture the missing data problem, i.e. the counterfactual data. In cases like this, Ravallion (2007) recommends collecting at least two rounds of ex-post surveys, i.e. an ex-post panel dataset.

In sum, ex-post impact evaluations have the benefit of reflecting reality but they are not without a cost. According to Khandker et al. (2010), ex-post impact evaluations are very expensive because they require a large dataset not only on the actual outcome of programme (i.e. the effect of the programme) participants and non-participants but also on other accompanying social and economic factors that can likely affect the outcome in the course of the intervention. Moreover, it is a matter of confidence whether appropriate factors have been chosen to compare the beneficiaries and non-beneficiaries (Blundell and Dias, 2000; Ravallion, 2007). This

[10] In non-experimental ex-post evaluations, the comparison group, also known as control group, can be households, individuals or organizations judged to be comparable to the treated households in all aspects except the treatment (i.e. intervention). The data from the control group is used to generate the counterfactual data (Cameron and Trivedi, 2005).

issue indicates the importance of having adequate knowledge on the features of both groups and the local environment where they belong, i.e. a necessary condition in applying appropriate assumptions in drawing a sample from the research population.

The research process of this thesis was developed considering the foregoing issues on non-experimental ex-post evaluation methods. Due to the nature and breadth of the research, panel dataset were collected via a structured questionnaire in the beginnings of 2011 and 2012 from a sample of farm households in peri-urban areas of Tigray, Northern Ethiopia. The main reason for collecting panel dataset is to control unobserved farm household specific factors on welfare and income diversification strategies and also to take advantage of large dataset which has the potential to improve efficiency of parameter estimates. The development and scope of the structured questionnaire is presented next.

3.4 Questionnaire Development

The researcher developed a multi-topic structured questionnaire. The questionnaire covered issues related to: demographic structure, consumption expenditure, income sources, investment decisions, land compensation, and perceptions on welfare and land compensation of the farm household (see details in Annex 3.1). The first three issues were developed by adapting structured questionnaire booklets used to conduct household surveys in Ethiopia and by drawing from the literature reviewed. The questionnaire booklets are from the Central Statistical Agency (CSA) of Ethiopia, the Economics department of Addis Ababa University and the Young Lives Project[11]. These sources represent a commonly applied research inquiry on

[11] The booklets are prepared to conduct different household surveys in Ethiopia. The Central Statistics Agency (CSA) of Ethiopia has its own standard structured questionnaire used to gather information on, among others, household income and welfare (the document is available at: http://www.csa.gov.et/docs/naming%20and%20coding.pdf). The department of Economics, Addis Ababa University, Ethiopia and the department of Economics, Gothenburg University, Sweden have jointly developed structured questionnaire booklet to collect household data on urban poverty from different urban centers in Ethiopia. The Young Lives Project is an international cross-country study on childhood poverty and wellbeing in developing countries, where Ethiopia is one of the countries (further details are available at: http://www.younglives.org.uk/).

household consumption and income in Ethiopia and offer a good starting point to develop the related questions in this research.

Questions related to land compensation; investment and perception were entirely developed by the researcher drawing from the literature reviewed, field observations and discussions held with related administrative units and community representatives in the study areas. Discussions were held with stakeholders in the respective survey sites. The stakeholders consist of urban and/or *woreda*[12] administrators, *tabia* administrators and community representatives. The main purpose of the discussions was to seek information about land compensation and related issues. These activities were undertaken before conducting the first survey and represent the stage where the qualitative approach was applied in this study. Findings of this approach provided a starting point to develop structured questions related to the issues in the discussions and used to improve the structured questionnaire.

The discussions held with urban and *woreda* administrators were focused on implementation of land compensation schemes and incentive packages for the farm households dispossessed of their property. Most of these discussions were held in the survey *woredas* mostly between October and November, 2010. The participants in each session were head of the *woreda*, one person in charge of the land administration department and two persons in charge of agricultural development and natural resources management department from the respective *woreda* administration. From these discussions the researcher was able to understand the presence of differences in the modalities employed to implement the national proclamation and the schemes of land compensation provided to the farm households dispossessed of their property which by itself is influenced by the resources available in the *woreda*.

After conducting the discussions with the *woredas,* other discussions were held with the respective *tabia* administrators and community representatives in November

[12] *Woreda* is an administrative unit which is equivalent to a district. Each *woreda* is composed of different *tabias* and each *tabia* is further sub-divided into villages known as *kushets* in rural areas and *ketenas* in urban areas. *Tabia*, also known as *kebelle* in other regional states of Ethiopia, is the lowest official administrative unit.

2010 in each *tabia*. These discussions were regarding perceptions and utilizations of land compensation schemes; and modes of the farm households' integration into urban labour markets. The participants in this discussion were the head of the *tabia*, one representative from each of the civic association namely farmers, women, youth and cooperatives, and three development extension workers (i.e. namely health, agriculture and natural resources extension workers). From these discussions, the researcher was able to gain additional information on alternative uses of land compensation and urban labour employment opportunities as well as a general opinion on land compensation.

Moreover, frequent visits were made to Enderta *woreda*, i.e. one of the survey sites and the biggest of all, between June 2010 and November 2010. During this period formal and informal discussions were held with the *woreda* administration and community members for the following reasons. Firstly, Enderta *woreda* is the worst affected *woreda* by urban expansion compared to other *woredas* in Tigray Regional State. Secondly, this *woreda* is situated within a walking distance of the researcher's home base, i.e. 5 to 10 kilometers and afforded convenience. Additionally, this *woreda* has the potential to represent other affected *woredas* in Tigray due to the similarities in the urban expansion procedures and the farm households' consumption and production behaviours. This process helped to develop questions related to land compensation and provided additional insights into the situations of farm households in peri-urban areas.

3.4.1 Piloting the Questionnaire

Questionnaire pretesting, also known as piloting, is an indispensible stage in developing a structured questionnaire. Conducting a questionnaire pretest:

> *ensures whether the proposed instruments will provide sufficient data, quality as well as quantity, to satisfy the objectives of the research; helps to test the form of the questions and their order; and is a mechanism to observe the potential problems of interviewing as well as respondents understanding of the questions (Shelby et al., 1982).*

Due to these advantages, it was imperative for the researcher to pretest the structured questionnaire before conducting the full scale survey data collection. Accordingly, this study conducted a pilot survey in November 2010 in one of the survey sites namely Lachi village, Mekelle to pretest the structured questionnaire. Sixteen households were included in the pilot[13]. The pilot survey was conducted by the researcher and four colleagues all working as enumerators. This procedure helped to improve the questionnaire in terms of its wording, the precision and sequencing of the questions. For instance, questions related to the household's employment and income were placed after consumption expenditure before piloting. But, then, were subsequently placed towards the end of the questionnaire where respondents became relatively more comfortable to talk. This is because questions related to income and employment are sensitive and the respondent were observed being losing interest in responding to the remaining part of the questionnaire. New questions were also added to the questionnaire from field observations. These include questions on modes of land rent in/out and the possible reasons behind utilization of land compensation.

3.5 Sampling Framework

As discussed in the section 3.2, the purpose of this study was to investigate urbanization effects on welfare and livelihood diversification strategies of farm households in PUAs which aimed to generalize from a sample to a population. This kind of study requires data on a representative sample from the population of interest. But intensity of the effects differs from one PUA to another depending on the local environment which again requires collecting data from different locations. In cases like this, a multi-stage sampling is recommended to adopt in order to collect data from a widely dispersed population (Bryman, 2008). Accordingly, a multi-stage cluster sampling framework was applied to identify the sample farm households for the survey.

[13] Although the literature recommends conducting a pilot survey in all the survey sites, this is less an issue in this study because the farm households have similar consumption and production characteristics.

Four towns were purposively selected in Tigray, Northern Ethiopia due to time and availability of other resources for the research (see map Figure 3.1). But these towns (namely Mekelle, Adigrat, Axum and Alamata) represent the major urban expansion features of Tigray Regional State in particular, and Ethiopia in general for the following reasons. Firstly, towns with a population of 20,000 and above are generally the fastest growing urban centers in Ethiopia and these towns apply similar urban expansion policies. These types of towns are concentrated in the regional states of Ethiopia where availability of land is relatively scarce and they share similar characteristics in terms of accessibility and availability of infrastructure. This in turn shapes the nature of employment opportunities in the urban areas. Secondly, the selected towns represent a significant range of spatial locations and different levels of local urban economies. Hence, they are useful in providing insights into peri-urban farmers' modes of economic integration and livelihood transitions in the context of a dynamic rural-urban continuum.

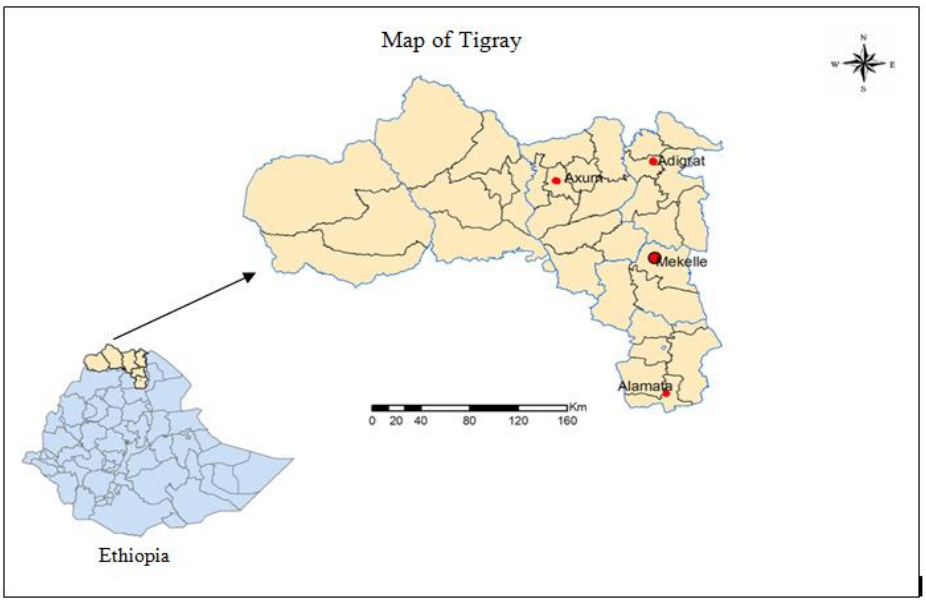

Figure 3.1: Map of Tigray Regional State, Ethiopia[14]

[14] Source: developed based on request by a colleague with expertise, Daniel Teka, Mekelle University.

Additionally, the selected four towns have one common feature and a number of differences. The common feature is that many farm households have been dispossessed of their farmland and received land compensation as a result. The land compensation scheme is designed at national level which is uniform and consequently follows a blanket approach. The towns have vital differences in terms of: (i) the amount and type of land compensation given to the dispossessed farmers which depends on the revenue of the respective town administration; and (ii) the size of economic activities, access to infrastructure and information, market size, population, and the agricultural production potential of the adjacent rural *woredas*. These differences have the potential to shape the type, pattern and availability of income diversification activities of the farm households in PUAs.

After selecting of the towns, *tabias* were selected from the adjacent *woredas* of the respective towns. The selection of *tabias* was done in collaboration with the respective *woreda* administration units. The level and direction of expansion of the respective town was taken as the main criteria to select the *tabias* and, subsequently, to select the *kushets (sub-villages)*. However, sample households were randomly selected from each *kushet* using the list provided by the respective *tabia* administration units.

Creating a comparison group is very important in quantifying the effects of an intervention on the targeted population (or the treatment group). Hence, households in the comparison (control) group are inhabitants of rural sub-villages adjacent to sub-villages of the treatment group. These households are selected as the control group because i) both groups could have been in similar situations without urbanization and ii) households in the control group are inhabitants of sub-villages that are possible targets of an intervention with implementation of the next town expansion plan.

The sample in each site consists of two groups such as (i) treatment group, i.e. households from rur-urban[15] sub-villages and hereafter known as rur-urban (farm)

[15] Rur-urban is a term created to distinguish the two groups of farm households in PUAs and used to represent farm households who are inhabitants of the pre-existing rural sub-villages but officially under the urban administrative boundary. The word rur-urban is created from two words - rural and urban - to represent the households current style of livelihood and the administrative boundary that

household and (ii) control group, i.e. households from rural sub-villages and hereafter known as rural households. The rur-urban sub-villages were pre-existing rural sub-villages but became under urban administration officially as a result of urban expansion. These households can be fully or partially dispossessed of their farmlands due to urban driven investments. The households in the control group are from sub-villages under the rural administration but are located within, 15kms from edge of the town, the boundary of peri-urban area.

In analyzing the effects of an intervention, participants' self-selection and non-compliance to the programme are the usual concerns (Wooldridge, 2002; Cameron and Trivedi, 2005). Self-selection is not a problem in this study because the sample for the treatment group is drawn from the pre-existing rural villages and the villages not established speculating expansion of the respective town. Moreover, the inhabitants are mostly born in the villages or related to them via marriage and migrants are not included in the sample. Similarly, non-compliance to the treatment is not an option for the participants because the entire sub-village (locally known as *kushet* which is a sub-*tabia*) is targeted and the inhabitants become urban residents officially. So far, urban areas are expanding by incorporating rural sub-villages in the surrounding. The incorporated sub-villages, then after, become officially in the urban administration. This splits administration of the village (*tabia*) to urban and rural which previously was under rural administration only.

Once the sub-village becomes under urban administration, the land within the delimited boundary is administered by the urban authority and expropriated for investment purposes any time within three to six months prior notice to the landholder (FDRE, 2005). Implementation of the different investments starts virtually after two years after delimitation of the boundary. But landholding of the farm household is within the *tabia* and fragmented. When sub-villages of the *tabia* are reclassified as urban, some households may have farmland in the sub-villages under the rural administration or the other way round. Households receive land

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they belong to, respectively. In a sense they are going to shift the predominantly agricultural activities to nonfarm activities sooner than the rural households in the nearby villages. However, both rur-urban and rural villages are located in the PUAs but different from an administrative and development planning perspectives.

compensation, regardless of the administration they belong, whenever their property is expropriated for public use such as expansion of infrastructures or other investments. The dispossessed farm households can use the farmland until investments are undertaken by another party although received compensation and have no official user rights.

The households in the treatment group are those who: (i) gave up, fully or partly, their farmland between 2006 and 2009; (ii) received land compensation; and iii) are recognized as urban residents officially. These time periods are set because provision of land compensation began in an organized manner in 2006, in Ethiopia, with the implementation of the Federal Proclamation *No. 455/2005* (FDRE, 2005). For farm households that became part of town administration after 2009, the time period is too short to observe an effect or change if considered for survey. The households in the control group are from villages officially under the rural administration in 2010[16] and adjacent to the villages where the sample for the control group is drawn.

3.5.1 Description of the Survey Sites

As explained before, the study focused on peri-urban areas of Tigray, Northern Ethiopia. The Regional State of Tigray consists of six zonal administrations (i.e. southern, south-eastern, eastern, central, north-western and western) and a special zone administration (i.e. Mekelle zone). Sample households were drawn from three out of the six zonal administrations (i.e. south-eastern, eastern and central) and Mekelle zone. The survey sites were located in the urban peripheries of these zones particularly in Mekelle, Adigrat, Axum and Alamata towns and the adjacent *woredas*, namely Enderta, Ganta-Afeshum, La'alay-Machew and Raya-Alamata (see map Figure 3.2). Mekelle is the largest urban centre in Tigray Regional State while Adigrat and Axum are among the second largest towns. Alamata is one of the rural

[16] For instance, Mekelle, Adigrat and Alamata towns have already delineated a new boundary by the end of 2011 based on their respective development plans. As a result, during the second survey almost all rural villages in the control group become under the respective town administration except in Axum. The farmers in these villages will continue to farm their farmland until the land is allocated for investment purposes by the town administration.

woreda centre towns but is growing relatively faster than others and is among the top ten large towns in Tigray Regional State.

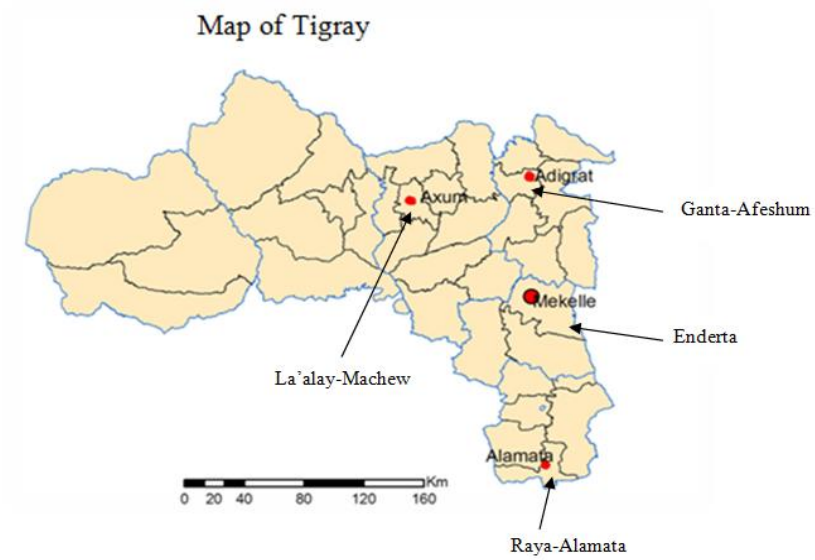

Figure 3.2: Location of the survey sites[17]

Looking at the population distribution from 1994 to 2007 (Table 3.1), there is tremendous growth in population in all towns. For instance, Mekelle's population census in 2007 is more than double that of the previous census, in 1994, which is exceptional. It represents a population explosion which needs to be explored but it is outside the objective of this study. The annual population growth rates of Axum and Adigrat towns are comparable except that availability of land for expansion seems more limited in Adigrat. A brief description of each of the survey sites follows next.

[17] Source: extracted from figure 3.1.

Table 3.1: Area and population distribution of the survey towns

Town/*woreda*	Area in km^2			Population size (in 000s)			Population growth rate 1994-2007
	1994	2007	2011	1994	2007	2011	
Mekelle	20.34	102.4	192	97	216	261	6.5
Adigrat	NA	18	18.77	37	58	70	3.5
Axum	7.78	17.28	18.12	27	45	54	4
Alamata	NA	4.7	9.46	26	33	40	1.8

Source: compiled from CSA (1995); CSA (2010a); CSA (2011b); BoFP (2011a); BoFP (2011b) and from the respective administrations for area size of Axum and Alamata.

Note: Population figures of 1994 and 2007 represent census results while those of 2011 are projected population sizes by CSA. Annual population growth rate is computed by the researcher. NA represents data not available.

Distribution of the households' farmland holdings is reported in Table 3.2. Both groups had similar landholdings in 2006, on average, except in Adigrat where rur-urban households have bigger farmlands than the rural ones. The proportion of landless farm households, in general, increased over time in all rur-urban sub-villages while relatively stable and small in the case of rural. The highest proportion of landless household is observed in peri-urban Adigrat where about 65% of the rur-urban farm households have become landless with five years due to urban expansion. Similarly, households in peri-urban Adigrat have the smallest landholding compared to the other peri-urban. This means, relatively, peri-urban Adigrat is highly populated which also concurs with the CAS data (see Table 3.1)

Table 3.2: Distribution of farmland holdings by year and group

	Rur-urban			Rural		
	2006	2011	2012	2006	2011	2012
Mekelle						
Average land holding per HH	3.98 (2.05)	1.85 (1.68)	1.90 (1.58)	3.38 (1.90)	3.22 (1.96)	3.15 (1.98)
Landless HH (%)	2.36	11.81	9.76	4.8	4.8	4.92
Observation (N)	127	127	125	125	125	122
Adigrat						
Average land holding per HH	2.15 (1.51)	0. 29 (0.54)	0.27 (0.54)	1.42 (1.06)	0.99 (0.94)	1.04 (0.97)
Landless HH (%)	15.91	70.47	70.73	9.09	23.26	23.68
Observation (N)	44	44	43	43	43	39
Axum						
Average land holding per HH	3.84 (2.05)	1.15 (1.08)	1.15 (1.09)	3.60 (1.55)	3.61 (2.06)	3.70 (2.00)
Landless HH (%)	2.56	30.77	31.58	7.69	5.13	2.63
Observation (N)	39	39	37	39	39	37
Alamata						
Average land holding per HH	3.70 (2.04)	2.45 (1.69)	2.45 (1.69)	2.75 (1.91)	2.67 (1.97)	2.75 (1.97)
Landless HH (%)	3.33	6.67	6.67	6.67	10.00	7.14
Observation (N)	30	30	30	30	30	28

Note: landholding is represented in *tsimdi* (1 *tsimdi* ≈ 0.25 hectare). Figures in the parenthesis represent standard deviations.

Mekelle city and Enderta

Mekelle[18] is the seat of the regional state; the centre of political, business and economic activities of the regional government; and the largest urban centre in Tigray. Due to these facts, scale and diversity of the infrastructure and economic activities are relatively larger and broader compared to other towns in the region. Consequently, availability of nonfarm employment opportunities is expected to be better. The town has been expanding into the adjacent *woreda*, Enderta, in all directions since mid 1990s.

According to Mekelle's municipality, physical boundary of the town was revised twice between 2005 and 2011. As a result, almost all of the rural villages in the

[18] Mekelle was also the capital of Ethiopia following Gondar during Emperor Yohannes IV (1871-1889).

control group are incorporated to Mekelle town administration towards the end of 2011, i.e. the inhabitants have become urban residents officially since then. Mekelle's built up area is expanding as a result of investments in residential housing, private enterprises and public and private institutions. But construction of private residential houses is the dominant activity and also land intensive.

Adigrat town and Ganta-Afeshum

Adigrat is a centre for the Eastern Zone Administration. This zone is characterized as having a high population density and suffers from severe natural resource degradation and recurrent drought. Adigrat town is located near to Ethiopia's border with Eritrea and is highly affected by the border conflict between the two countries. As a result, generally productive private investments in the town are limited compared to other areas. But the town is expanding mainly due to investments in private housing and a newly established public university, Adigrat University. Because of the establishment of the university, dwellings for a number of farm households were demolished. As a result, most households received compensation which consisted of a plot of land (mostly 100 meter square) and a minimum sum of money to build their new houses at a different location but within the same locality. The location provided to them to build their new houses might not necessarily be based on their choices and preferences. According to the respondents, households were placed to a new location on a lottery basis. Ganta-Afeshum is the adjacent *woreda* that Adigrat town is expanding into by including the villages that belong to this *woreda.* May-mesanu and Bikot *tabias* of the *woreda* are most affected as a result of the town expansion.

Axum town and La'alay-Machew

Axum is a centre of administration for different zone known as Central Zone. Compared to the Eastern Zone, this zone is relatively better-off in terms of agricultural resource endowment and has a lower population density. Axum was also

the capital of the Axumite kingdom[19] and is currently among the top tourist attraction centers in Ethiopia due to its rich historical heritage. Consequently, investments in large hotels, tourist centers and related facilities are increasing. Moreover, a new public university, Axum University, was established in 2007 and has played its role in expanding the town. Axum is expanding into the pre-existing rural villages of the adjacent *woreda*, La'alay-Machew, and villages that belong to *tabia* Medogo and Hatsebo are the most affected as a result.

Alamata town and Raya-Alamata

Alamata town is a *woreda* centre located in the Southern Zone of the region. The scale and diversity of economic activities of the town are limited compared to the other survey sites. Raya-Alamata is the adjacent *woreda* and relatively endowed with fertile farmlands but it is drought prone and affected by recurrent drought. Alamata's expansion is mostly concentrated around the main route that connects the capital city, Addis Ababa and the regional capital, Mekelle. Private investments in housing and hotels dominate the type of investments. It is a fast growing small town in the regional state.

3.6 Sample Size

The sample sizes from each survey sites were determined by the extent of expansion of the respective town and availability of resources for the survey. The total sample in the first survey was 478, consisting of 240 rur-urban and 238 rural households. A uniform proportional sample, i.e. 8.5% of the total households in the respective *kushet*, was drawn from each rur-urban *kushet*. In order to keep the sample size equal in both groups in each survey site, different proportions were drawn from the corresponding rural *kushets* ranging from 6.2% to 10.3% of the total households. The corresponding sampling probabilities have been taken into account in the analysis and the estimation results were weighted accordingly. The survey covered 17 *tabias* in total and distribution of the sample is provided in Table 3.3.

[19] The Axumite Kingdom (1st c. BC – 10th c. AD) is historically known as the start of civilization in Ethiopia.

Table 3.3: Distribution of the survey sample

Zone (*Woreda)*	*Tabia/kebelle*	*Kushet/ketena*	Sample	
			2011	2012
1. Mekelle				
Mekelle urban			127	125
(North)			107	105
	Industri	Lachi	47	45
	Ayder	Adiha	60	60
(South)			20	20
	Hadnet	Aynalem	20	20
2. South Eastern			125	122
Mekelle rural			125	122
(Enderta)	Mahbere-Genet	Adikanawalid	21	21
	Mariam-Dehan	Endagabir	6	6
		Hirshima	19	19
		Halawil	19	19
	Mai-Ambesa	Mai-Eumori	20	20
	Shibta	Gergembes	20	20
	Debri	Debri	20	17
3. Eastern			86	81
(Adigrat urban)			44	43
	Kebelle 01	Ketena 3	13	13
	Kebelle 04	Ketena 6	30	30
(Adigrat rural)			43	38
(Ganta-Afeshum)	Bukot	Bukot	14	11
		Mai-Be'aa	5	5
	Mai-Mesanu	Mai-Mesanu	10	8
		Be'ati	7	7
		Kendaero	7	7
4. Central			77	74
(Axum Urban)			38	37
	Hawelti	Ketena 3	25	24
	Hayelom	Ketena 4	9	8
		Ketena 5	2	2
	Maebel	Maebel	3	3
(Axum Rural)			38	37
(La'alay-Machew)	Medego	Medego,	9	9
		Sefeho	8	7
	Hatsebo	Hatsebo	5	5
		Hawastu	2	2
		Semeret	10	10
		Adikerni	5	4
5. Southern			60	58
(Alamata urban)			30	30
	Kebelle 01	Ketena 3	15	15
	Kebelle 04	Ketena 3	9	9
		Ketena 2	2	2
		Ketena 1	4	4
(Alamata Rural)			30	28
(Raya Alamata)	Kulugize-Lemlem	Jahan	10	10
	Selam-Bikalsi	Garbe	20	18
Total			478	461

3.7 Ethical Considerations

Selecting sample households from the respective *kushets* was not simple. It was important to get permission from the respective *woreda* administration units to access the *tabias* otherwise communications with the local community would have been very difficult. After discussions with the respective *woreda* administrative units, they consented to the research. As a result, the researcher was able to conduct survey; hold discussions with the community representatives; and access relevant documents in the selected *tabias*.

In conducting social research the relationship between the researcher and the research participants is a concern. For instance, issues such as protection, privacy and informed consent of the research participant are important principles in exercising social research (Bryman, 2008). In carrying out this research it was necessary to consider the time required of respondents and the outcome of the research. From brief discussions with potential respondents it became clear that the research would benefit the researcher but not the respondent. But, then, they were also willing to sacrifice their time and cooperate to participate in the research. Given this it was necessary to ensure that the research would not take much of their time. Moreover, it was clear that the research participants implicitly acknowledged that the level of the right to privacy is compromised for that specific period of time. But in order to protect their privacy, the respondents were ensured that their data would not be transferred in ways where a third party could identify them.

3.8 Survey Data Collection Process

Due to the breadth and nature of the research, it was necessary to involve a research team to gather the survey data. The team included the researcher and field assistants consisting of eight enumerators, two field supervisors and two field guides. The field assistants were highly experienced in collecting household survey data and could speak the local language, Tigrigna. The role of the researcher during the survey was to closely

follow the data gathering process. The researcher was present throughout the survey and actively engaged in the field work. The task of the enumerators was to gather data through the administration of the structured questionnaire. The field supervisors' task was to monitor the progress of the research and ensure the data was gathered from the sample households.

Before starting the main survey, the researcher had given intensive training to the field assistants for four days. This training included oral instructions on research protocols, the questionnaire and the research in general. It also included practical experience in completing the questionnaire. During the practical exercise, more emphasis was placed on questions related to land compensation issues because the other questions were quite familiar to the field assistants. The same procedures were followed before starting the second survey where the same field staff were recruited and trained.

The role of the field guides was to locate the respondents and inform them that the enumerators were there to gather some information but they did not stay during the interview. After the enumerator was introduced to the respondent, the general procedure was as follows: i) the enumerator explained briefly the purpose of the visit; ii) assured the household the information will be confidential and not harm the respondent in any way; and iii) when the respondent agreed to cooperate, then the enumerator filled in the structured questionnaire with the respondent. In cases where the respondent was unwilling to cooperate, the procedure was to stop the conversation and move to the next household in the sample list. But such experience was rare. Due to the lengthy nature of the questionnaire, the enumerators were sometimes obliged to stop the interview for a while and wait until the respondent was comfortable to continue.

Panel data were collected in two rounds from same households. The data were collected using face-to-face interview and recorded on paper. The main reason for adopting this approach is that almost all respondents did not have an adequate literacy level to understand and fill in a structured questionnaire by themselves. Moreover, other basic infrastructures were either absent or inefficient to employ as alternative research instruments.

The first survey was conducted from mid December 2010 until January 2011. The second survey was conducted a year later in exactly the same months. Both surveys were conducted by the same field staff. These procedures assure comparability and minimize seasonal variability of the survey data. The questionnaire had incorporated recall questions, such as details related to demographic structure, housing, livestock and land ownership of the household, back-dated to 2006, and the same month of the survey time. These recall questions addressed only quantity of the listed items but not the monetary values. These types of questions can be easily recalled and answered by the respondents (McKenzie, 2005).

The attrition rate, i.e. proportion of dropout in the second survey, was only three percent. The major reasons for the dropout were either unavailability of a household member for interview at the time of survey or a location change of the household (Table 3.4). From size of the dropouts and the reasons, the evidence does not indicate a presence of systematic dropouts that can cause bias. Every household, except the dropouts, has two observations. No new households were added in the second survey to replace the dropouts which ultimately reduced the sample size from 478 to 461, consisting of 234 rur-urban and 227 rural households.

Table 3.4: Reasons why households dropped out in the second survey

Reasons	Observations
Old and sick not able to speak properly	4
Household roster cannot be recovered[20]	3
Household moved out of the village	4
Head died and household dispersed	2
Head died and widow was in mourning	1
Not available during the survey for unknown reason	3
Total	17

[20] A household roster, but not part of the questionnaire, was prepared in the first survey mainly to locate the household in the second survey. The roster consists of members list and location of the household. However, in the questionnaire codes were used to represent name and location to protect privacy of the household and keep the household's anonymous to third parties.

Both surveys were commenced towards the end of the main harvest season in the agricultural calendar of Tigray Regional State in particular and in Ethiopia in general. But macro factors particularly rainfall and inflation are crucial for the households' welfare. As Tigray region is known for low and erratic rainfall, the amount and distribution of rainfall in the wet season (*kiremt*[21]) is crucial to food security of the subsistence farmers. According to the respondents, in all the survey sites except in Axum, the amount and distribution of rainfall in *kiremt* 2010 was good but in 2011 the rainfall started late and stopped earlier than the usual. As a result, agricultural production in south and eastern parts of the region was negatively affected which in turn had direct negative impact on food security of the farm households in those parts, particularly in 2011/2012.

Whenever distribution of rainfall is below normal during the wet season, the Early Warning and Response Department of the Ministry of Agriculture and Rural Development of Ethiopia usually makes the necessary preparations to include more farm households in the productive safety net programme (PNSP) than the usual to protect their food security and assets from stress selling. Hence more rural households are expected to participate in the PNSP programme in 2012 compared to 2011.

Inflation, negatively affects consumers rather than producers, was rising in 2010 in Ethiopia. To curb the rising inflation, particularly on food, the Federal government of Ethiopia has introduced price ceiling for about 18 commodities in the market in January, 2011 and the price ceiling was lifted for most of the goods in July, 2011 (Mesfin, 2011). But introduction of the price caps was counter-intuitive and exacerbated inflation because inflation has increased from below 20% in January, 2011 to 40% in July, 2011 (Figure 3.3).

[21] *Kiremt* is the local name for the wet season which stats in June and stops in September.

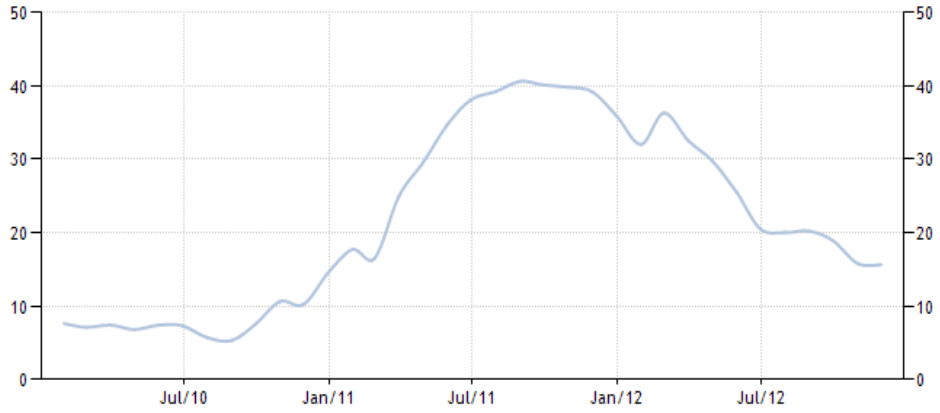

Figure 3.3: Ethiopia inflation rate July, 2010 to July 2012

Note: the figure is adopted from www.tradingeconomic.com| Central Statistics Agency of Ethiopia[22].

3.9 Data Processing and Methods of Analysis

Immediately after collecting the survey data, the data were transferred from hardcopy to softcopy format. This means the survey data were transferred to an excel worksheet format prepared by the researcher. This procedure was followed by data cleaning, i.e. checking whether the data was correctly transferred, and made ready to be processed by any statistical packages for analysis. Both tasks were done by recruiting assistants with experience. Again these tasks were done under close supervision of the researcher. Finally, data were exported to a statistical software package known as STATA for analysis.

As explained, this study aims to estimate the relationship of the household's welfare and income diversification decisions with multiple factors that are internal and external to the household. It is not easy to observe the direct effect of the different factors because the outcome variable could be affected potentially by multiple factors concomitantly. However, partial effects of the different factors can be estimated using statistical methods. Accordingly, econometric methods were applied to analyze the primary data

[22] Accessed via: http://www.tradingeconomics.com/ethiopia/inflation-cpi

and address the research objectives. By the nature of the research objectives, each empirical chapter has a distinct model developed on the basis of its own theoretical foundations. The models applied to analyze the primary data are presented and defended under each chapter. For convenience, a summary of the analytical and econometric models applied to address the research objectives, in reference to the chapters, is provided in Table 3.5.

Table 3.5: Summary of analytical and econometric models applied

Objective	Analytical model	Econometric model	Dealt in Chapter
First			four
Second	Ex-post impact evaluation	Difference-in difference with propensity score matching	five
Third: -objective measures -subjective measures	Consumption growth at micro level	- Hausman Taylor or Random Effect - Multinomial logit	six
Third, Fourth, and Fifth and sixth	- Income diversification strategies - Madala's Random utility	- Multinomial logit	seven

3.10 Conclusion

The research focused mainly on examining quantitative changes in welfare and asset holding; livelihood strategies and utilization of financial resources of farm households in peri-urban areas and factors that influence these issues. By doing so, the purpose was to generalize from a sample to the population so that inferences can be made on the main contributing factors. Given the nature of urban expansion in developing countries

and the knowledge gap regarding farm households' mode of urban life integration, the research has placed greater emphasis on depth rather than massive coverage.

The uniqueness of this research is that it provides empirical evidence on urbanization effects on peri-urban farm households in Northern Ethiopia, in particular, and Sub-Saharan Africa, in general, by applying rigorous analytical methodologies. So far, to the best knowledge of the researcher, no research has been conducted on the effects of urbanization on the peri-urban areas of Sub-Saharan Africa at a micro level by applying ex-post impact evaluation methods using panel dataset.

The research is limited to the role of economic parameters of urbanization effects. However, this does not mean that the role of non-economic factors such as social claims and relationships, institutions and environmental issues are less important in influencing urban life integration of the farm households in peri-urban areas. Before moving to the empirical chapters, background information on the study area and a description of the survey data is provided in chapter four. The purpose is to acquaint the reader with the socio-economic context of the study area, assess the effects of peri-urban transformation on the pre-existing villages in the urban peripheries and nature of the dataset used for the analysis.

CHAPTER 4: DESCRIPTION OF PERI-URBAN DEVELOPMENT IN ETHIOPIA AND THE SURVEY DATA

4.1 Introduction

This study focuses on the peri-urban development of Tigray, Northern Ethiopia. Ethiopia's land and economic policies and general features of peri-urban developments are discussed briefly in sections 4.2 and 4.3 to provide background information on features of the economic growth and situations of urban expansion. Section 4.4 presents the economic performance and urbanization situations in Tigray Regional State to familiarize the reader with the study area and examine the *meso* level effects of peri-urban transformation. As indicated in the methodology chapter, primary data were collected from a sample of farm households in peri-urban areas of Tgray Regional state. Hence, a general description of the survey dataset is given in section 4.5. To provide an overview of the primary data, section 4.5 presents the terms and definitions used for the analysis and section 4.6 provides the summary statistics. Further description of the data is presented under each chapter whenever it is necessary.

4.1 Urban Expansion and Peri-urban Areas: the Context in Ethiopia

As indicated in the previous chapter, Ethiopia is a Federal State where all regional states abide by the federal laws and policies. This means all regional states carry out the federal law and can design plans and strategies in line with the federal policies. Hence, this section provides an overview of the land policy of Ethiopia which is crucial to the land administration systems of Ethiopia and plays an important role in urban expansion via the provisions on access to land. Similarly, the national economic policy and key priorities of the government organizations (i.e. the different ministries) are discussed to show how they respond to the dynamic livelihood changes in peri-urban areas.

4.1.1 Urban Expansion and Land Policy

Ethiopia has the same land policy since 1974 where land - urban as well as rural - is owned by the state. During the *Derg* regime[23] (1974-1991), farmers had land user rights which prohibited land transfer, lease, sale or mortgage. During this period, rural land was generally redistributed bi-annually to farmers on the premise of ensuring equal distribution of farmland to farmers. This activity had led to a fragmented and dispersed landholding system. Similarly, in the current policy, farmers (individuals) have land user rights which prohibit them from selling or mortgaging the land but allow them to lease it or to transfer it to their descendants (FDRE, 1995; 1997). Further land re-distribution (distribution) to farmers has been limited since 1997.

Every urban center has its own boundary which is subject to revision every ten years based on its development plan (FDRE, 2008). An urban area can expand its boundary after the development plan is approved by the respective council. The trend so far shows that urban centers are expanding at an increasing rate by incorporating the adjacent rural villages. This process has intensified dislocation of the subsistent farmers from their property (e.g. farmland, house, etc.). According to sources from the different district (*woreda)* administrations, until the end of 1990s, compensation to farmers (individuals) who are dispossessed of their properties was not exercised in an organized way and was mainly vested on the local authorities' power and resources. Since the issuance of the land compensation proclamation in 2005 (FDRE, 2005), farmers (individuals) affected by urbanization expansion processes have started to receive compensation in an organized way. But because of a fragmented landholding system[24],

[23] *Derg* is the name of the political party which governed Ethiopia during the period 1974-1991 by toppling Emperor Hailsilasie (1930 - 1974). But even during the emperor time the major share of farmland was owned mainly by absentee landlords (or the statesmen) who belonged to the clergy and state farms, which implicitly indicates that land was owned by the state.

[24] Ethiopia is known for fragmented peasant landholding systems as a result of the frequent land redistribution policy practiced during the *Derg* regime (1971-1991). Accordingly, it is possible for a farmer to have more than two plots at different locations and with different soil quality but within the boundary of the smallest administrative unit.

farmers might receive a number of small payments at different times depending on the time that the land was appropriated for investment. This may make the farmers' resource utilization decision difficult because the likelihood to consume is higher when the amount of money is small and inflation is higher than interest rate of saving.

The decision on type and amount of land compensation is vested in the hands of the respective *woreda*[25] or urban administration (FDRE, 2005) and is based on a basic formula issued by the Council of Ministers, i.e. regulation No. *135/2007* (FDRE, 2007). This regulation issued a basic formula that can be employed to compute the financial compensation for the farmland and housing. For housing, it consists of an estimation of the current construction expenses, transportation cost and other dislocation expenses. Compensation for farmland bases on the crop productivity of the land in the past five years. It is the product of an average of the past five years' harvest, current local market price per quintal and ten[26].

In other words, compensation for a farmland is assumed to be a value equivalent to crop income that could be earned for the coming ten years. Additionally, the average crop income is estimated by a committee delegated by the authority. From this, it is clear that estimation of the farm income seems uniform and subjective. Similarly, such kind of compensation scheme overlooks inflation; has no alternative ways of treating land quality and type of crops; disregards the effect of adoption of improved technology on production; and underestimates, mostly ignores, the value of investments made on the farmland such as permanent trees like fruits or cactus or shallow wells. Moreover, the rationale for the ten year time span is not clearly evident and articulated.

Land compensation in Tigray Regional State is in accordance with the proclamations and regulation issued by the federal government explained in the preceding paragraph. Depending on the revenue of urban administration and type of investments undertaken,

[25] *Woreda* is an administrative unit which is equivalent to district.

[26] For farmland holdings with less than five years, average production is computed by considering the number of years and if it is a new one, it is computed by looking at the productivity of comparable land in the vicinity (FRDE, 2005).

the type and amount of compensation can differ from place to place. According to the *woreda* administrations, there are cases where farmers received larger amounts of land compensation when their land is appropriated for big private companies. But when revenue of the respective urban administration is small or the market value of land is low, there are cases where farmers receive a plot of land as compensation with a maximum size of 250 square meters. According to the *woreda* officials, this is the common practice when farmland is used for investments in residential houses and public institutions like health centers, schools and public administration buildings. These facts indicate that land compensation is not equitable even within the same urban administration and farmers receive compensation depending on the perceived land price. This in turn suggests farmers living around bigger towns with the potential to attract large investors are more likely to receive better compensation compared to the others.

4.1.2 Urban and Peri-urban Areas

The level of urbanization in Ethiopia is below the East African average, about 23% (Un-Habitat, 2010a), and the proportion of urban population is still very small[27]. According to the 2007 census, about 16% of the population live in urban areas (CSA, 2008) and this proportion is expected to be about 40% by 2050 (Huq et al., 2009; Un-Habitat, 2010b). This indicates that urban areas in Ethiopia will continue to expand and could do so at higher rates than the relatively urbanized sub-Saharan Africa countries. Moreover, urban expansion in Sub-Saharan Africa is intensively land-demanding (UNPFA, 2007) which is also true particularly in Ethiopia.

[27] The proportion of Ethiopia's urban population has changed from 14% to 16% between the two census periods, i.e. between 1997 and 2007. The recent estimates indicate that about 20% of the population lives in urban areas (CSA, 2011b). Even though the proportion is very small, the trend indicates the country's urban population is growing an increasing rate.

Urban Areas

Ethiopia has a federal system of governance consisting of nine regional states and two special city administrations[28]. Each regional state and city administration has a mandate in its jurisdiction to design proclamation and implement policies and strategies that are non-federal but in conformity to the federal decree. For instance, the regional states have the right to decide the maximum landholding per household. This indicates that the regional states can use different procedures to implement the same federal proclamation.

There were no criteria applied to define what an urban center (*ketema* is the local name usually used) consists of prior to 2008[29]. In 2008, Ethiopia issued an urban planning proclamation which sets criteria to define what constitutes a *ketema* (FDRE, 2008). This proclamation considers a locality as a *ketema*: 1) if it has an established municipality; and 2) if it has at least 2000 inhabitants of which 50% of the labor force is engaged mainly in non-agricultural activities. However, the proclamation does not set criteria to distinguish the size of the urban centers on the basis of population density, economic activity, availability of infrastructures, etc. This indicates that the regional states possibly use different criteria to classify towns.

[28] Ethiopia is a country that did not have a comprehensive urban development plan until 2005 (UN-HABITAT, 2007). Until 1991, Ethiopia was a country governed by a unitary administrative system and was divided into different provinces (locally known as *Rasgez* during the emperor regime, 1930-1974, and later renamed to *Kiflehager* during the *Derg* regime, 1974-1991). Since 1991, Ethiopia is under a federal administrative system and is divided into regional administration systems where inhabitants' language and ethnicity is the basis for territorial division of the different regional states.

[29] In Ethiopia, *ketema* is the local name mostly used to indicate any urban center. There are no stated criteria to distinguish between a city and a town or among towns. Different organizations use different methods to define urban centers. For instance, the Central Statistical Agency of Ethiopia (CSA) criteria are quite different from the national proclamation. According to CSA, urban centers are all administration centers such as regional, zonal and *woreda* capital and all settlements with village (*kebele or tabia)* administration whose inhabitants are engaged primarily with non-agricultural activities (CSA, 2008).

Peri-urban Areas

In Ethiopia, neither the national nor the regional proclamations characterize what peri-urban areas are. In this study, a peri-urban area refers to the pre-existing rural villages surrounding the towns including their farmlands, grazing and other common lands. These villages can be part of the urban administration due to implementation of an urban development plan or under the rural administration. The regulations and administrative authority of land use in these areas can be under either urban or rural administration. The urban administrative body allocates land that belongs to peri-urban areas for investments on the basis of the urban development plan. The development plan can have separate locations for investments on manufacturing (usually known as industrial areas), residential houses or institutions. This indicates that peri-urban development is mainly a result of processes originated and driven from urban centers which concurs with Webster's (2002) description of peri-urban development.

The peri-urban areas are mostly agrarian in orientation but subject to change into urban oriented activities in short period of time with the implementation of urban development plans. This process is quite similar to Rakodi's (1999) peri-urban description. Usually farmlands and common lands are allocated for development purposes and sometimes private houses can be demolished for the same reason. In the latter case, inhabitants are relocated to different localities within the same rural administrative unit (i.e. depending on availability of land but rare in Tigray Regional State) or within the urban boundary by receiving another plot of land to build new houses provided by the local authority.

4.1.3 Economic Policy and Sector Development Priority

The economic policy of Ethiopia is Agricultural Development Led Industrialization (ADLI) since mid of 1990s. The policy document has mentioned the importance of the rural nonfarm sector to rural development. The rural nonfarm sector activities are quite similar to the micro and small enterprises (MSEs) in the urban context. The current five years - from 2009/10 to 2014/15 - development plan known as Growth and Transformation Plan (GTP) of Ethiopia has emphasized the significance of MSEs in

achieving sustainable economic development (FDRE, 2010). The document sets out a clear policy direction on how to improve and strengthen the productive capacity of the sector. This indicates that the national policy has recognized the role of rural-nonfarm or MSEs in economic transformation of Ethiopia. However, the concern is the lack of clarity and integration between the authorities responsible for the implementation of the designed policies.

Rural areas of Ethiopia are under rural administration and guided by agricultural and rural development policy. The Ministry of Agriculture and Rural Development (MoARD) plans and administers agricultural and rural development policies. But operations of MoARD usually focus very much on productivity of the farm sector. This suggests that peri-urban farm households were/are also benefiting from the agricultural packages and extension services provided by the Ministry. So far the rural development policy packages of the ministry have no clear direction on the nonfarm sector. This in turn suggests that most farm households in peri-urban areas have better skills in the farm sector. But it is obvious that most farmers in peri-urban areas derive their means of living from both farm and nonfarm sectors. This is because studies indicate that farmers' participation in rural nonfarm activities is more concentrated near to towns and cities (Woldehanna and Oskam, 2001; Woldehanna, 2002; CSA, 2007a; Loening and Mikael-Imru, 2009).

Urban development activities are designed, implemented and monitored by the Ministry of Urban Development (MoUD). Development activities and operations of both ministries are more focused on the manufacturing, trade and service sectors. MSEs are more pronounced in the operational documents and considered as a means to address urban unemployment, poverty and income of the urban poor (MoFED, 2006; 2010). But, urban agriculture is not recognized as a source of livelihood in the operational documents of both ministries. This implies that the presence of a gap between the knowledge and skills of most farm households in peri-urban areas and the policy directions of urban development.

In summary, MoARD focuses on the farming sector and has failed to properly promote the rural nonfarm sector likely due to lack of a balanced approach between the two

sectors. Urban development policies also overlook the importance of urban agriculture as a means of reducing urban unemployment and poverty. From the preceding discussions, it is clear that farm households in peri-urban areas are intensively engaged in both farm and nonfarm activities. But these farm households seem neglected by both urban and rural development priorities due to urban – rural demarcation which overlooks the strong consumption and production linkages. This has a direct implication for the lives of peri-urban farm households, especially during their transition from rural to urban livelihoods, in terms of how they respond to emerging employment opportunities.

4.2 Peri-urbanization in Ethiopia

Administrative boundaries of urban areas in Ethiopia expand over time. Demarcation of the new boundary of the urban center is enacted after the respective development plan is defended in a public hearing and approved by the respective council (FDRE, 2008). Once the development plan is approved, the administrative body of the urban center in consultation with the surrounding rural administration or the regional council amalgamates the surroundings rural villages whenever new space is needed for implementation of the development plan. This process ultimately creates a new boundary to the urban center and expands the administrative boundary outwards.

As a result of the territorial expansion of urban areas, rural villages in the surrounding area become officially under the urban administration. This is followed by allocation of farmlands and other common lands for different purposes by the respective urban administration. Depending on the development plan, each urban administration allocates peri-urban land for different agents (individuals or private or public organizations). This is the stage where urbanization of the peri-urban areas begins in Ethiopia. Then land allocation is followed by construction of new residential houses, public (private) institutions, manufacturing plants or installations of other urban amenities in very short periods of time. As a result, land use is converted from subsistence agriculture to industrial, residential and other urban purposes. According to

Webster (2002), these types of investments are known as urban center driven investments and the growth process is mainly dispersed from the center to the peripheries.

Land use changes of the peri-urban areas create heterogeneous social compositions and economic structures in the locality. For instance, new residents mostly engaged in different sectors of the urban economy migrate to the locality; subsistence agrarian activities are progressively (mostly between two to five years) overtaken by trade, service and manufacturing activities; new land policies are put in place and new land markets emerge which results in the commoditization of land and housing. As a result, the pre-existing farm households might be intensively (or extensively) engaged in different nonfarm activities to support their livelihoods. Such types of transformations are observed in most peri-urban areas of Ethiopia and are similar to the peri-urbanization processes of many developing countries (for other countries' experience see Ingram, 1998; Webster, 2002; Webster and Muller, 2002; Simon et al., 2004; Webster et al., 2004). But the concern of this study is the outcomes of these transformations.

4.3 Tigray Regional State's Economic Performance

4.3.1 The Socio-economic Situation

Tigray Regional State is situated in the northern part of Ethiopia. It is bordered by Eritrea in the north, Sudan in the west, Amhara Regional State in the south and Afar Regional State in the east. The region is divided into six zonal and one special zone administrations. The zonal administrations further divided into a total of 46 *woreda* (district) administrations, out of which 12 districts are urban districts. In 2007, average family size in the region was 4.4 (which is 3.4 in urban areas and 4.6 in rural areas) while the national average was 4.6 (CSA, 2008). According to 2007 census, total population of Tigray Regional State was about 4.3 million consisting of 985,654 households with an average population density of 80 persons per square kilometer. The highland and mid-highland areas are the most densely populated parts of the region.

Subsistence agriculture is the main means of living for about 80% of the region's population. The region is divided into three traditional agro-ecologies; namely, highland, mid-highland and lowland. More than two thirds of the population live and make a living in the highland and mid-highland areas which cover about 40% of the total area (BoFP, 2010b). The lowland, covers about 60% of the total area, is less populated and has huge potential for agricultural production. Generally, the region is characterized as drought prone, having poor agricultural productivity and a high level of food insecurity.

A mixed farming (production of both crop and livestock) system is the dominant farming activity in the region. The region's agricultural policy is based on conservation agriculture. The region gives top priority to soil and water conservation activities and agricultural intensification production system, through expansion of irrigation systems, to improve agricultural productivity. About 20% of the people were rural residents in 2007, which is slightly above the national average which is 16% (CSA, 2008).

Infrastructure in the region has generally improved recently. Access to road infrastructure has improved with the implementation of the nation's 10-year Road Sector Development Program[30] designed in 1997. For instance, the proportion of people having access to the nearest market with a travel time less than five hours has increased from 23% in 1994 to about 40% in 2007 but is below the national average which is about 68 percent (Schmidt and Kedir, 2011)[31]. This indicates that the majority of the people have to travel more than five hours to access major market centers, communication services, financial institutions and health centers (such as clinics and hospitals). All urban areas located on the main roads (all-weather roads), and some rural towns located outside the main roads, have access to 24 hours electric power supply.

[30] A brief narration of the Ethiopia's ten year Road Sector Development Program support project document is available at the World Bank website and can be accessed via: http://www.worldbank.org/projects/P000755/road-sector-development-program-support-project?lang=en

[31] Schmidt and Kedir (2009) define market accessibility as the travel time required to reach a city with a population of 50,000 and above. Please refer to Schmidt, E. and Kedir, M. (2009) for details of the methodology applied.

Access to basic education and health services is also improving. For instance, primary school enrollment is more than 90 percent (BoFP, 2010a). There is at least one health extension worker in every village[32] (Argaw, 2007).

Farmers in the region have access to a single microfinance institution known as Dedebit Saving and Credit Institution (DESCI). Most of financial institutions in the region, such as commercial and construction banks and insurance companies, serve urban people. This is because the banks require collateral to process any loan and have a very lengthy screening process which limits serving the rural population. Services of the existing insurance companies are limited to property and liability insurance packages. There are 10 commercial banks, 10 insurance companies and 13 higher education institutions[33] in the region (BoFP, 2011). Almost all privately owned service providing institutions are concentrated in the region's capital, Mekelle town. Very few financial institutions are present in the commercially active second largest towns. But the state owned commercial bank, Commercial Bank of Ethiopia, has at least one branch in every *woreda* administrative center.

There are a number of public and private owned technical and vocational training centers designed to train technical personnel in the fields of agriculture, health, building, mechanical and business. But the prevalence of underemployment and unemployment is very high. Some trainees are involved in small and micro business enterprises and benefit from support packages (e.g. financial and technical) designed by the regional government.

[32] The health extension workers are mainly female health officers who are trained in technical and vocational schools. They implement health extension packages focusing on preventive health mainly in rural areas. For details please refer to Argaw (2007).

[33] The Commercial Bank of Ethiopia is the dominant bank in the region and has extensive coverage. Out of the 13 higher education institutions, three are public universities namely Mekelle, Axum and Adigrat Universities. Mekelle University is relatively the oldest and biggest while Adigrat University is very young, established in 2010. The other institutions are privately owned colleges and are relatively small.

4.3.2 The Region's Economic Performance

The Tigray region's gross domestic product (GDP), similar to the national economy, was growing by about 10% on average between 2006 and 2010 (BoFP, 2010a). According to BoFP (2010b), the services sector is the fastest growing sector in the region followed by the industrial sector. The mining and quarrying and the construction sub-sectors are the major contributors to the performance of the industrial sector (see Table 4.1). Performance of the manufacturing sub-sector is the lowest compared to the other productive non-agricultural sub-sectors. The share of agricultural and industrial sectors to the regional GDP has decreased between 2006 and 2010 while the share of the service sector has increased. The service sector is slightly dominating the regional economy in terms of its contribution to the regional GDP. Expansion of urban areas and the informal sector could be the major contributors to the performance of the service sector. The industrial and service sectors together accounted for 61% of the regional GDP in 2010 while the share of the agriculture sector is about 39% which is slightly below the national average of 45%.

Agriculture in the region is characterized as subsistence, rain-fed and mixed farming (crop and livestock production) system. Cereal production dominates the sector and about 65% of the total agricultural production is used for household consumption (CSA, 2010b). The region's agricultural output for export consists of white sesame, hides and skin. Agricultural productivity is still very poor and slightly lower than the national average. For instance, the region's average crop harvest is 15.8 quintals per hectare while the national average is 16.34 quintals per hectare (CSA, 2010b). This is likely due to erratic rainfall and low soil fertility combined with high soil erosion and a low level of technology adoption.

According to the CSA (2011a) report, average farm size in the region is 0.93 hectares per household while the national average is 1.18 hectares per household; there are no farmland holdings beyond two hectares which is the maximum limit in the region; and more than 80 percent of the farm households own less than one hectare. In general, given the current level of farm technology, the size of farmland is too small and barely absorbs the growing rural labour force. Additionally, many young farm households

have limited access to farmland and the number of landless youth is also increasing in the rural areas. Given the limited access to farmland, the rural nonfarm activities might serve as a hub for many rural youths but the attention given to the sector in the development policy is marginal.

The size of rural nonfarm enterprises in Ethiopia is significant where about 25% of the rural households have participated in the sector (CSA, 2007b; EEA, 2008; Loening and Mikael-Imru, 2009). Many farm households in the Regional State of Tigray have actively participated in the rural nonfarm sector (sometimes referred to as off-farm) to supplement the meager farm income and to diversify their means of living. The dominant activity in the sector is trade (i.e. mostly trading of agricultural goods). Almost all nonfarm enterprises are sole proprietorships and single person enterprises (CSA, 2007b; Loening and Mikael-Imru, 2009). Operators of nonfarm activities usually sell their products in the local markets and to the passersby.

The level of poverty in Tigray Region State, in general, is decreasing. For instance, the proportion of people in the region living below the poverty line was about 56% in 1995, increased to 61% in 2000, and has reduced to 32% in 2011 (MoFED, 2012). But the level of poverty in the region is still slightly above the national average 29%. Urban and rural poverty have reduced at different paces. Between 2000 and 2011, urban poverty reduced from 60% to 14% and rural poverty has decreased from 61% to 37% (MoFED, 2012). Rural poverty is still very high although urban poverty is relatively low and reducing at a faster rate. In general, the evidence seems to support the positive association between economic growth and poverty reduction.

Table 4.1: Growth rate and sector contribution to GDP, at constant prices

	Tigray				National			
Description	2006/07	2007/08	2008/09	2009/10	2006/07	2007/08	2008/09	2009/10
Growth rate								
1. GDP	11.3	11.8	10.2	10.5	11.8	11.2	10	10.4
2. Agriculture sector	9.2	11.4	7.9	9.6	9.4	7.5	6.4	7.6
Crop		*11.1*	*7.5*					
Livestock		*8.8*	*8.1*					
Forestry		*7.4*	*7.9*					
3. Industry sector	9.5	9	9.4	10.1	9.5	10.1	9.7	10.6
Mining and quarrying		*28.7*	*18.9*					
Manufacturing		*-7.8*	*6.3*					
Construction		*24.6*	*14.4*					
Water and Electricity		*15.4*	*-1.4*					
4. Services sector	14.4	13.7	13.0	11.6	15.3	16.0	14.0	13.0
Distributive service		*10.2*	*25.4*					
Transport and communications		*10.1*	*5.0*					
Other services		*17.02*	*4.8*					
Sector contribution to GDP								
1. Agriculture	40.1	39.9	39.1	38.7	46.1	44.6	43.1	42.0
2. Industry	20.1	19.6	19.4	19.4	13.2	13.0	13.0	13.0
3. Services	39.8	40.5	41.5	41.9	41.7	43.5	45.0	46.1
Total	100	100	100	100				100

Source: compiled from BoFP (2010a), (MoFED, 2011) and own calculations (subsector growth rates are own calculations based on BoFP data).

Note: All figures are in percentages. The national figures of sector contribution to GDP include estimates of financial intermediation services in directly measured (FISIM) and do not add up to 100.

4.4 Urban Expansion Trends in Tigray Regional State

The distribution of urban centers and their respective population sizes for Tigray Regional State and Ethiopia is reported in Table 4.2. The data indicates that number of urban centers in the nation has increased between the last two census in 1994 and 2007 while in Tigray Regional State it has reduced from 74 to 57 (CSA, 2010a). But in the regional data source, it is 68 urban centers (BoFP, 2010b). This clearly shows that both, the Central Statistics Agency (CSA) and Tigray Regional State, have applied different criteria to categorize a settlement as urban. In either case, the reduction in number of the urban centers might be due to re-classification of some urban centers into rural areas as they failed to fulfill the minimum population size and/or the functionality to be recognized as urban. However, the urban population in the region has approximately doubled between the last two census which is faster than the national rate even if the number of urban centers reduced.

In 2007, urban population in Tigray Regional State was about 20% and was higher than the national average 16%. Between 1994 and 2007, urban population increased by 85% in Tigray and 59% at national level. Moreover, the number of towns with over 10,000 residents in Tigray region has doubled between 1994 and 2007[34]. A number of factors may contribute to this expansion. The main factor may be rural-urban migration (especially out-migration of the youth) as a result of limited access to suitable and fertile farmland and urban-urban migration (mostly from smaller towns) as there are visible differences between the urban centers in terms of level and avaliablity of infrastructures and job opportunities. The displacement of Ethiopians from the neighbouring country Eritrea, due to the border conflict between the two countries, might also have contributed to the current urban population growth.

[34] According to 2007 census, Tigray is in the third place in terms of the proportion of urban population compared to the other nine regional states in Ethiopia (Bane J, and Alamu T. 2012).

Table 4.2: Distribution of urban centers in Tigray Regional State and Ethiopia

	Tigray				National			
	Urban centers		Population (in **000s**)		Urban centers		Population (in **000s**)	
Population	1994	2007	1994	2007	1994	2007	1994	2007
Up to 2000	37	2	38	4	412	165	421	222
2001-5000	18	17	58	60	304	357	1,031	1,216
5001-9999	10	20	68	146	129	244	903	1,672
10000-19999	3	9	53	119	60	116	980	1,623
20000-49999	5	7	141	241	39	61	1,133	1,804
50001-99999	1	1	97	58	8	15	539	1,076
100000-150000	-	-	-	-	3	10	449	1,673
150001-500000	-	1	-	212	-	-	-	-
Above 500000	-	-	-	-	1	1	2,085	2,740
Total	74	57	455	844	956	969	7,452	11,870
Population Change between1994 – 2007 (%)				85				59

Source: compiled from (Debebe, 2003); (CSA, 2010a); (CSA, 2011b)

Out of the total urban population in Tigray Regional State in 2007, about 26% live in Mekelle; about 35% live in other towns with a town administration (which is equivalent to a district administration); and the remainder live in smaller and emerging rural towns. Most of the towns with a status of town administration are centers for different zonal administrations, i.e. the administrative units next to the regional state. This means about 60% of the region's urban population lives in seats of the top administrative units in the regional state.

Mekelle's population share of the region's urban population increased from 21.3% in 1994 to 26% in 2007. Moreover, there is a large difference in population size between Mekelle and the second largest town Adigrat (details see Table 3.1) where Mekelle's population is about four times that of Adigrat. This indicates that Mekelle continues to attract more people (rural as well urban migrants) and is growing enormously as a result. This trend in turn may results in creation of "urban primacy crisis", meaning a situation where few urban centers become excessively dominant relative to other settlements (Henderson, 2002).

4.4.1 Classification of Urban Areas in Tigray

In line with the national proclamation, the Regional State of Tigray set criteria to classify urban settlements into two groups in its proclamation, *Proclamation No. 107/1998EC,* (TRS, 2006). As to this proclamation, the classification is based on the population size, economic activity and availability, scale and varieties of the infrastructures. Accordingly, a settlement is known as small or emerging town if it has a minimum of 2000 inhabitants and the labor force is mainly engaged in nonfarm activities. Additionally, an emerging town should have a basic level of administrative institutions and socio-economic infrastructures such as police, market, schools, roads and transport and telephone services. The proclamation considers a settlement as a *town* if it satisfies the three criteria: i) it has a population of at least 20,000; ii) it should have relatively better industrial activities such as in manufacturing, trade and service sectors; and iii) it should possess larger urban infrastructures and institutions. Generally, the economic activities in towns are expected to employ advanced technology compared to the small or emerging towns and be dominated by manufacturing, trade and services while agricultural activities are very limited. Similarly, households' livelihoods are expected to be mostly based on employments in nonfarm activities and self-employment in home-based household enterprises.

The duties and powers of the urban administration are given or delegated by the concerned authority (FDRE, 2008). All towns in Tigray Regional State have *ketema* administration which is equivalent to *woreda* administration and the duties and powers of the respective urban administration are given by the regional council. So far, town is the highest status of urban centers recognized in the regional state and only 12 urban centers have a status of town (TRS, 2006). Four out of the 12 towns are sources of data for this thesis.

4.5 Description of the Survey Dataset

As discussed in the previous chapter, panel data were collected for analysis using a structured questionnaire from sample farm households in peri-urban areas of Tigray, Northern Ethiopia. The household is the unit of analysis in the entire thesis. A two

wave panel dataset were collected on details of the household's demography, consumption expenditure, income, employment, investments, asset holdings (i.e. durables, land, housing and livestock), access to public infrastructure, saving and utilization of land compensation money.

In order to create a comparable groups – rur-urban and rural households – *ex-ante* data were collected on recall basis by incorporating retrospective questions in the questionnaire. These data consist of the household's demographic composition, education and possession of farmland (in *tsimdi*), livestock (i.e. only type and quantity) and housing (i.e. number of rooms and type of roofing, wall and floor) for the year 2006. The questions related to details of *ex-ante* asset holding addressed only the respective assets' quantity but not the monetary value. This is because it could be difficult for most respondents to recall the monetary values of the items.

Questions related to consumption and income details were not always easy to answer. In cases like these, the enumerator had to wait for the respondent to be comfortable with the questions or visited again. The respondent was either head of the household or his/her spouse. Local units were used to collect and report the dataset. *Tsimdi* is used to measure area of farmland where one *tsimdi* is equivalent to quarter of a hectare. Monetary values are measured in Ethiopian currency known as Ethiopian *Birr (*ETB)[35]. Necessary price adjustments were made on household's expenditures and value of livestock owned and livestock products to remove the temporal price effects[36].

[35] The official rate for 1USD was 16.54ETB and 17.23ETB on average during the first and second survey periods respectively.

[36] Household consumption expenditure is computed in constant prices (real values) by adjusting inflation using the consumer price index (CPI) for Tigray Regional State available in the CSA dataset with reference to December 2010 prices. Similarly, the national producer price index (PPI) is used to compute the value of livestock owned and livestock products from the same source because no PPI is available on a regional basis but not a concern for this study.

4.6 Terms and Definitions Used

4.6.1 Household Consumption Expenditure

Consumption expenditure is collected at household level and expressed in ETB. It consists of expenses on, or equivalent values of, all food items consumed and non-food consumables excluding expenditures on investment, durable goods, health and schooling. The main reason for not collecting expenses on schooling and health is not because they are less important rather both services are provided by the public for free or at a subsidized price. Consequently, collecting expenses on these items might not reveal the precise expenditure. Household consumption from the services of housing and durable items is excluded to avoid bias since there is no standardized unit that helps to measure their market values. This is because renting a house is not usually practiced in rural areas and no indexes are available to compute the depreciated values of the different durable goods owned by the household.

Household expenditure represents the monetary value of household consumption originating from purchases, own produces, gifts and transfer sources. Items consumed by the household from own produce, gifts and transfer sources are converted to an equivalent monetary value using the local market prices. The consumption basket of the household consists of food (such as cereal, pulses, vegetable, oil, livestock products, coffee, spices, honey and sugar), non-private goods (such as energy, transport and communication, ceremonial, taxes, social contributions and other miscellaneous household items), beverages and private clothing.

Recall model was used to collect details of the household consumption expenditure due to resource and time factors. Household food consumption expenditure was collected on a weekly recall basis which comprises of household consumption from purchased products, own produce, transfers and gifts. Consumption from non-purchased sources is represented by an equivalent monetary value using the local market price, i.e. the proxy for the producer's farm gate price. The 7-day recall is effective compared to longer recall periods but not error free because of recall and telescoping errors and incapable to capture individual expenditures outside the purview of the respondent (Beegle *et al*, 2012). The data for expenses on non-food

consumable items was collected on a monthly recall basis and expected purchase frequency of each item for the year.

The total weekly food expenditure is converted to monthly total food expenditure. The monthly expenses for food and non-food consumables were deflated to December 2010 price using the respective consumer price indexes for Tigray Regional State available in Central Statistics Agency of Ethiopia (CAS)[37]. The main reason for taking December 2010 as a base is that the Ministry of Finance and Economic Development (MoFED) of Ethiopia has produced a new poverty line and changed its time reference from 2006 to 2010 same month. Hence, real household expenditure in this thesis is computed using December 2010 prices.

It is important to note that data were collected towards the end of the harvest season and during the Christmas festival where food consumption and consumption expenditure of the farm household in general are expected to be higher than the other seasons especially compared to the lean season. As a result, on average, the aggregated expenditures on food consumption are likely higher than the actual expenditures would be. Similarly, the non-food consumption expenditures were recorded as zero if the household did not spend on the specific item(s) during the month right before the survey time. As a result, on average, the annual non-food consumption expenditure is likely understated for some households. However, these problems are less important for inter-temporal comparison of household welfare since data were collected in the same months for both surveys.

4.6.2 Household Income and Employment

The literature classifies income sources of rural households into on-farm, off-farm, nonfarm and unearned income (Ellis, 2000). According to Ellis (2000), on-farm income is income earned from own cultivated land and livestock; off-farm income refers to income generated from primary sector production systems like on-farm but not from one's own farm and includes income from collection of natural resource

[37] The document is available at: http://www.mofed.gov.et/English/Resources/Documents/Interim%20Report%20on%202010-11%20Poverty%20Analysis.pdf

(e.g. sand and stone mining, firewood, wild fruit, etc.); nonfarm income consists of income generated from secondary and tertiary sector production processes and unearned income. Unearned income is also known as transfer income which consists of income from remittance, gifts, rent, pension, social transfer, etc.

Many authors classify income streams of the farm household as farm and off-farm income where nonfarm income is treated as a sub-category of off-farm income. In some cases the distinction between off-farm and nonfarm activities is not clear. But this thesis adapts Ellis's (2002) classification of farm household activities and income sources. Hence, income sources of the farm household are broadly classified in to farm, nonfarm sector and unearned income. Farm income consists of income earned from farming – own farm and other farmer(s) farm - and from natural resource extraction. A household is considered involved in farm or nonfarm activity, if at least one member of the household is engaged in the specific activity.

Nonfarm income consists of income earned from labor employment. Employment in the nonfarm sector is further classified in to skilled and unskilled employment based on the returns. This classification is more convenient to examine whether the households are engaged in the nonfarm sector to accumulate capital or for mere survival. Skilled nonfarm employment (waged or self) refers to an employment opportunity that requires possessing a non-agricultural skill or an initial investment to be engaged in the activity and relatively rewarding activity (e.g. commerce, plumber, masonry, carpenter, civil servant, etc). Unskilled employment refers to an employment (waged or self) in low-return activities (e.g. domestic work, daily laborer, street vendor, embroidery, blacksmith, etc). A household is considered as engaged in skilled nonfarm employment, if at least one member of the household has earned income from skilled employment.

4.7 Survey Findings: Descriptive Statistics

4.7.1 Distribution of Household Characteristics

The summary statistics of household characteristics is given in Table 4.3. Compared to the rural households, on average, heads farm households in rur-urban areas seem

older and have fewer children. Heads' literacy of the rural households is a little bit better than heads of the rur-urban households. The proportion of female headed households has increased from 20% to 33% between 2006 and 2012 in rur-urban areas whereas in the rural areas it is stable around 26%.

Between 2006 and 2012, the rur-urban households' ownership of the main productive assets in the farming system (both farmland and livestock) has reduced. On average, rural households have a larger size of farmland compared to rur-urban households. Similarly, rural households' livestock ownership in general tends to show an increasing trend between 2011 and 2012 while size of farmland has decreased. Farm household's livestock ownership is represented in monetary values and tropical livestock unit (TLU) indices (details of conversion indices are given in Annex 4.1). However, the TLU indices do not have a conversion factor for cross-breed or imported cattle such as bulls or dairy-cows. Hence, the index indicated for a local cow is used to compute the corresponding TLU for cross breed or Holstein dairy-cow. As a result, the computed TLU is likely to understate the value of livestock for households who own cross-breeds or exotic breeds. The monetary value of livestock owned is expressed in constant prices[38], where farm gate prices are adjusted for inflation using the producer price index (PPI)[39].

[38] Nominal livestock value is computed using the average local market prices for the respective items.

[39] All values are represented in ETB and corrected for inflation to the base year December 2010 using producer price index (PPI) available in the database of the Central Statistics Agency (CSA) of Ethiopia. The database is available at www.csa.gov.et .

Table 4.3: Summary Statistics of capital and asset ownership of the households by group

	Rur-urban (Treatment group)			Rural (Control group)		
	2006	2011	2012	2006	2011	2012
Variables	Mean (sd)	Mean (sd)	Mean (sd)	Mean (sd)	Mean (sd)	Mean (sd)
Household Head age	50.61 (15.53)	54.67 (15.30)	55.25 (11.20)	43.53 (13.51)	48.11 (13.64)	49.24 (13.98)
Numbers of adults	2.94 (1.58)	3.11(1.72)	2.93 (1.67)	2.73 (1.32)	3.15 (1.53)	3.15 (1.53)
Number of children below 15 years old	2.15 (1.75)	1.73 (1.63)	1.73 (1.71)	2.33 (1.77)	2.29 (1.63)	2.32 (1.69)
Number of adults above 65 years old	0.24 (0.49)	0.01 (0.51)	0.33 (0.56)	0.07 (.27)	0.15 (0.39)	0.19 (0.36)
Livestock value in 000's ETB (in December 2010 prices)		6.76 (11.5)	6.26 (9.62)		6.64(6.99)	8.14 (9.34)
Livestock in tropical livestock units (TLU)	3.86 (3.96)	2.63 (3.04)	2.62 (3.09)	3.13 (2.80)	3.14 (2.64)	3.15 (2.67)
Farmland owned in *tsimdi*	3.87 (2.36)	1.56 (1.55)	1.56 (1.55)	2.84 (2.19)	2.84 (1.03)	2.84 (2.02)
Number of rooms owned	2.38 (1.36)	2.73 (1.49)	2.60 (1.31)	1.88 (1.13)	2.00 (1.17)	2.05 (1.08)
Female headed household (%)	29.17	33.33	32.48	26.05	26.73	26.43
Household head farming main job (%)	62.08	46.25	36.59	68.90	70.16	61.94
Household head level of literacy						
Illiterate (%)	60	60.08	60.52	55.93	55.04	55.51
Adult literacy and church school (%)	7.91	9.16	6.03	9.75	10.08	7.49
Lower primary (grade 1- 4) (%)	10.42	12.08	11.16	17.8	17.23	17.62
Upper primary and above (grade 5 plus) (%)	18.74	16.67	22.32	16.51	17.65	19.38
Observation (N)	240	240	234	238	238	227

The proportion of the household heads in PUAs that considered farming as a main job generally has decreased between 2006 and 2012. The percentage of household heads in rur-urban areas that mainly depend on farming was about 63% in 2006 and decreased to 37% in 2012 while for the rural households it has decreased from about 71% to 62%. The decrease in the head's main job of rur-urban households concurs with the observed trends of livestock and farmland ownership.

4.7.2 Household Expenditures

Real consumption expenditure of the rur-urban households, on average, was significantly higher than the rural households in 2011 (Table 4.4). In 2012, no significant difference is observed in the average consumption expenditure of the two groups. But between 2011 and 2012, the consumption expenditure of the rur-urban households has decreased strongly and significantly compared to the rural household. More than 75% of the household's total expenditure is spent on food. Above 50% of the food expenditure is spent on cereals. For instance, on average, rur-urban households spend about 56% their total food expenditure on cereals while it is about 51% for rural households. Non-food expenditure accounts less than one third of the food expenditure. This indicates that the households' expenditure is mainly spent on food and dominated by expenditures on cereals.

The distribution of food expenditure among the household members is difficult to know because they eat together from one plate. However, it was possible to identify the distribution of expenditures on clothing and entertainment (such as on beverages). Private expenditure on clothing does not seem to be gender biased. But expenditure on beverages, is culturally dominated by men, and is much higher than the expenditure for clothing. Usually, expenses for energy (especially for cooking purposes such purchasing of firewood, charcoal, kerosene or electricity for light) and transportation and communication are lower in the rural than the rur-urban households. This could be because the rural areas have relatively free access to natural resources (such as foraging of firewood, water and cow dung from the common property resources) and lack of access or coverage of electricity, communication networks and portable water supply.

Table 4.4: Distribution of real annual expenditure by year and group

	Rur-urban		Rural		Mean Difference in change (rur-urban – rural)
	2011	2012	2011	2012	
Real total expenditure (in 00)	**168.42**	**152.93**	**148.85**	**180.93**	**-46.79**
	(94.50)	**(77.64)**	**(73.16)**	**(97.19)**	**(7.47)*** **
Real food expenditure(in 00)	**135.56**	**123.73**	**128.05**	**152.22**	**-35.61**
	(68.74)	**(63.13)**	**(64.96)**	**(84.00)**	**(6.23)*** **
Cereal	68.29 (44.75)	63.47 (37.69)	60.15 (35.59)	65.67 (35.21)	
Pulses	11.90 (82.50)	12.93 (8.22)	11.66 (7.06)	12.37 (37.18)	
Oil	7.07 (4.39)	6.36 (4,16)	6.33 (3.85)	5.47 (3.76)	
Vegetable	6.94 (7.69)	6.64 (6.92)	6.72 (6.79)	5.43 (4.57)	
Animal product	2.50 (2.83)	2.96 (7.04)	24.60 (37.68)	9.41 (13.49)	
Spices, coffee, tea, sugar	21.41 (10.03)	23.64 (11.33)	16.59 (8.16)	21.86 (9.25)	
Real nonfood expenditure (in 00)	**32.86**	**29.66**	**20.79**	**28.82**	**-11.18**
	(42.56)	**(23.03)**	**(29.87)**	**(29.87)**	**(3.31)*** **
Non-private expenditure	21.94 (36.22)	20.74 (17.54)	10.34 (7.36)	13.65(26.34)	
Beverage	8.79 (13.22)	7.87 (13.08)	7.89 (8.53)	12.90 (11.73)	
Private women	0.39 (1.24)	0.39 (1.86)	0.39 (1.22)	0.46 (1.75)	
Private men	0.60 (2.41)	0.32 (1.20)	0.52 (2.54)	0.33 (1.37)	
Private girls	0.86 (2.43)	0.38 (1.33)	0.75 (2.15)	0.61 (2.44)	
Private boys	0.85 (3.57)	0.37 (1.11)	0.91 (2.22)	0.87 (3.55)	
Observations (N)	240	234	238	227	

Note: All figures represent hundreds. All values are deflated to December, 2010 prices using the consumer price index (CPI) available in CSA and figures in brackets represent standard deviations except those under the column for the mean difference are standard errors.

Households meet their food consumption through production, purchase and aid. The proportion of households in rur-urban that purchased cereal crops for food consumption is twice of that of those in rural (Table 4.5). On average, rural households covered 80% of the total consumption of cereals from their own produce whereas this figure is 50% for the rur-urban farm households. Most peri-urban farm households - both rur-urban and rural - are net buyers of pulses, oil, spices and vegetables.

Table 4.5: Distribution of food items for consumption by source and group in 2011

	Households purchased (%)		Ratio own-produced to total consumption (%)		Ratio purchased to total consumption (%)	
	Rur-urban	Rural	Rur-urban	Rural	Rur-urban	Rural
Cereals	66	34	50	80	49	20
Pulses	96	82	3	22	95	74
Oil	95	94	0	2	100	97
Animal products	18	25	83	68	17	29
Beverages	52	47	21	38	74	56
Coffee, sugar, tea	97	100	0	0	98	99
Spices	98	99	0	3	99	95
Vegetables	90	89	4	8	93	90
Observation (N)	240	238	240	238	240	238

4.7.4 Household Employment Schemes

Farm households can be engaged in farm and nonfarm activities in order to diversify their income sources. As defined previously, farm employment refers to engagement in agricultural activities (i.e. crops, vegetables, fruits, dairy products and fattening) and in extraction of natural resources or natural resource-based activities (i.e. collection of firewood, sand mining, stone mining, etc.). Farm employment consists of own farm activities and self-employment or waged employment outside own farm but directly related to primary production. Self-employment comprises of activities related to collection and selling of natural resources such as stone, sand, firewood,

charcoal and wild fruits. Waged employment includes paid community work particularly in the productive safety net programmes and paid work in farms owned by others. Nonfarm employment includes self-employment (usually known as own-account business which is mostly dominated by petty trade) and waged employment (such as skilled and unskilled employment) in any private or public company or institution on a permanent or daily employment basis.

Community works usually are within the *tabia* and involve development activities mainly related to land and water conservation, reforestation and sometimes maintenance of dams, rural roads and social services like water points, schools and clinics in the community. As part of the conservation/agricultural policy of Tigray, in rural areas every adult is obliged to work 20 person-days[40] per year in conservation activities without payment. An individual who has worked more than 20 person-days received 3kg of grain (or the monetary equivalent) per person-day. But whenever community work is limited, priority is given to the poorer households. The community works on payment basis are generally known as safety net programmes.

Most of the farm households in PUAs are engaged in farming activities (Table 4.6). The proportion of rur-urban households' engaged in farming increased in 2012 compared to 2011 while the proportion of self-employments in nonfarm activities decreased. Presumably some households closed their business and shift to farm and unskilled employment activities but does not mean that these farm households reclaim land for farming. They probably operate the farming activities on the land still under their possession or rented in land. Hence, this indicates that more rur-urban farm households are being attracted to farm activities although access to farmland is limited. Most of the farm households are engaged in nonfarm activities and the majority of them are involved in waged employment. But the proportion of households that partake in skilled nonfarm employments decreased in 2012 compared to 2011 for the rur-urban households while this increased for the rural households.

[40] Although no uniform rate, the general approach is that one person-day is equivalent to eight hours work of an adult person.

Rur-urban households' employments in farm activities and nonfarm activities increased between 2011 and 2012. Households' participation in productive safety net programme (PSNP) is lower in 2012 compared to 2011 and the rural farm households have higher participation levels compared to the rur-urban ones. This is could be because, although there is direct support programme[41] from relief organizations in some urban areas, PSNP is: a rural development program; organized and monitored by the rural administration; usually associated with owning farmland in rural areas; and implemented to mitigate food insecurity and protect farmers assets from stress selling. The other reason could be that some households may be restricted from participating in community works by the local authority when their wealth status improves, i.e. locally termed as graduating from the productive safety net program. However, from the discussions held with the farmers, some farmers reflected their concerns of reverting back to their previous status in over time.

Generally a number of factors, i.e. specific to the household and the local environment, might contribute to the peri-urban farm households' decision to engage in different income generating activities. Identifying factors that affect peri-urban farm household's employment decisions has important implications for possible interventions. This issue is further investigated in chapter 7 of this thesis.

[41] Direct support refers to when the household receives aid from relief organizations without participating in the community works. This is applied usually when the household is poor and cannot support a member who is terminally sick or old.

Table 4.6: Percentage Distribution of farm households' employment by group and year

	Rur-urban		Rural	
Type of activities	2011	2012	2011	2012
1. Nonfarm employment:	57.92	67.23	66.96	70.04
a. waged employment	41.25	48.94	50.84	53.30
skilled	69.78	51.89	54.75	59.88
unskilled	30.21	48.10	45.25	43.83
b. self-employment	27.50	22.98	19.33	15.86
2. Farm employment:				
a. in own farm*	61.32	76.17	92.00	91.00
b. natural resource and others farm				
self-employment			13.44	3.50
productive safety net	41.20	38.08	72.69	63.00
in others farm			0.84	1.76
Observation (N)	240	234	238	227

Note: *own farm represents any farm activity consisting of crop and livestock production, in the context of subsistence farming, and can be operated on own land and/or rented-in land. Figures represent percentages and do not add up to 100 percent because there are households who participate in more than one activity.

4.7.5 Household Investment and Sources of Finance

The data show that farm households have invested in various activities such as nonfarm activities (usually known as own-account business), farming, skill development and housing (Table 4.7). The rur-urban households have made more diversified investments than their rural counterparts[42]. In peri-urban areas, in general, investment in housing is the highest followed by farming (such as livestock and irrigation equipment). About 29% of rural households and about 53% of rur-

[42] During the survey, about fifteen activities were listed on the type of investment activities. But the number of observations under each activity is small and this necessitated regrouping the activities in to six broad categories as indicated in Table 4.7.

urban households have invested in housing. This difference could be mainly because houses for a number of households in the peri-urban areas of Adigrat and Alamata were demolished. For instance, part of a village is demolished in peri-urban Adigrat to build Adigrat University and in Alamata to construct a highway that connects Addis Ababa and Mekelle.

The proportion of rur-urban households investing in nonfarm activities such as petty trade, snack houses, transport and shops for repair and maintenance is very small. Although buying and selling of land is prohibited by the law, few rur-urban households have engaged in such transactions. Land transaction between individuals is likely done through unofficial agreements (usually on a loan basis) between the buyer and the seller. But the transaction could be technically endorsed after some investment is made on the land. Investments in skill trainings and higher education (mostly in private institutions) is generally very low and non-existent in the case of rural households.

Table 4.7: Percentage distribution of household investment from 2006 to 2011 by group

Type of activity	Rur-urban	Rural
Business	5.88	3.36
Livestock and irrigation equipment	13.03	21.01
Building house or renovating	52.52	28.99
Bought plot of land	4.20	
Skill training and education	3.36	
Transportation scheme	4.20	1.26
Not invested	16.81	45.38
Observation (N)	240	238

To finance their investments, farm households have used a variety of sources such as loans (from microfinance, friends, relatives, civic associations and money lenders), savings, sale of assets (such as livestock, land and house), gifts and grants. Rural households have used more diversified sources for their investments compared to the rur-urban households (Table 4.8). For the rural households, savings is the dominant

source of finance followed by loans from formal sources mainly the Dedebit Credit and Saving Institute. The proportion of rural households (50%) that used savings to finance their investments is about three times that of the rur-urban households (16%). Almost all rur-urban households (88%) and few rural households (about 11%) used land compensation to finance their investments. This suggests that rural households are accumulating assets while the rur-urban households' are exchanging one asset with another asset, i.e. farmland is converted to money via land compensation and this money is subsequently invested in specific assets/activities. However, it is not clear whether the investment activities of the rur-urban households indicate asset depletion or asset accumulation. Although illegal, the sale of land is another source of finance for investment to both the rur-urban and rural farm households.

Table 4.8: Sources of finance for investments made during 2006 to 2011

Sources of finance	Rur-urban (%)	Rural (%)
Savings	15.50	50.00
Loan from Microfinance institutions	5.00	28.46
Loan from money lenders	0.00	0.77
Loan from friends or relatives	2.50	0.77
Loan from IRC, cooperatives or civic associations	0.00	2.31
Land compensation money	88.50	10.77
Inheritance	0.00	1.54
Sale of livestock	0.00	4.62
Sale of land or house	5.50	10.77
Observations (N)	230	108

Note: figures do not add up to 100 since households can use multiple sources. N represents only households who invested between 2006 and 2011.

4.7.6 Utilization of Land Compensation

The rur-urban farm households utilized their land compensation money for consumption, investment and saving purposes (Table 4.9). Most households in the sample, i.e. about 80%, received their land compensation between 2006 and 2008.

The land compensation package consists of money and a plot of land within the urban administration. About three quarter of the households' received money and 25% of the households received money and a plot of land, in the range 140 to 350 square meters per household, as compensation. On average, about 50% percent of the land compensation money is utilized for investment and a significant proportion, about 35%, is spent to cover consumption expenditures. Investment on housing consists of about 80% of the total investment.

Table 4.9: Type and use of land compensation of the rur-urban households

	Mean	Std. Dev.	Percentage
From the compensation :			
consumed (ETB)	14242.02	15982.93	35.00
to purchase food items	10672.14		
invested (ETB)	24981.59	33868.77	50.00
to build new house (s)	19509.59		
saved (ETB)	8929.126	17375.47	15.00
Households compensated in year (%):			
2006			11.26
2007-08			68.04
2009-10			20.78
Households used compensation (%):			
only for consumption			7.81
for investment and/or saved			15.25
for consumption, investment and/or saved			74.30
Type of compensation (%):			
only money			73.75
only land			3.75
money and land			22.5
Observation (N)	240		

The rur-urban farm households used the land compensation money to finance different investment activities where the dominant type is investment on housing (Table 4.10). But what matters is the type of investments and the driving forces behind these investment decisions. From those households that have invested, 67% of them invested in housing while 21% of them invested in nonfarm income

generating activities. Very few households invested in their children's education (7%), i.e. in higher education and vocational training, in farming activities (10%) and in the purchase of empty plots of land (9%). Investment on housing is the first priority for most households. This indicates that most households are keen to invest on housing for at least two main reasons. Firstly, houses for some households were demolished due to peri-urbanization. Consequently, these households built new houses as a replacement to their old houses which is the case in peri-urban Adigrat and Alamata although not clear that the investment was sufficient enough to complete the house. The other reason could be households might be attracted by the existing urban housing market or could be a reflection of the absence of knowledge or alternative options to invest on other productive ventures.

A significant proportion of the land compensation money (35%) is utilized for consumption where about 75% of what is consumed, on average 10672ETB per household, was spent to purchase food items (Table 4.9). Additionally, about 8% of the households spent the land compensation money only for consumption purposes. Most households used their land compensation to cover their food consumption expenditure and expenditure on food items is listed as the first priority for almost all households (Table 4.10). But it is unclear that if some of the rur-urban households were exposed to food insecurity and facing difficulty in covering their food expenditure over time.

Table 4.10: Priorities in use of the land compensation money of the rur-urban households

	First (%)	Second (%)	Third (%)	Average
Consumption:				
Food items	95.34	3.2	2.13	82.18
Durables goods	0.52	80.8	6.38	45.65
Ceremonials/festivals	1.55	4.8	68.09	17.83
Given to children	1.55	8.8	21.28	10.83
Debt repayment	1.04	2.4	2.13	2.61
Observations (N)	193	125	47	230
Investment:				
Purchase equipments or goods	16.67	22.02	22.22	20.86
Renovate a house	4.55	3.39		4.79
Built new house	66.67	16.95	11.11	62.18
Higher education	3.03	15.25	11.11	6.96
Farming	4.55	32.20		9.92
Bought land	4.55	10.17	55.56	8.70
Observations (N)	198	59	9	230

4.8 Conclusion

Urban areas in Tigray Regional State are expanding rapidly at a higher rate than the national urban growth rate. Urban boundaries have expanded by incorporating the adjacent rural villages and then the subsistence farming activities are being replaced by urban driven investments. The urban expansion process is land-intensive. This in turn limits access to farmlands, sets new land price and changes the peri-urban farm households' livelihood and asset composition. Size of farmland and livestock holdings of the affected (rur-urban) farm households is reduced. As Table 4.6 shows, the rur-urban farm households are shifting their means of living to nonfarm activities and are in a state of transition into the mechanics of an urban economy. However, the transitions from the natural resource-based livelihoods to the cash-based livelihoods were slow. Additionally, it is not clear how the farm households in PUAs transform their farm dominated skills and knowledge to nonfarm and which

government organization or authority is responsible to promote the livelihood transition.

To improve the productive capacity and provide reliable employment opportunities for the farm households in PUAs, promotion of the livelihood transition process is a reasonable option. However the nature and determinants of the livelihood transition and the links to the rural economy- farming and nonfarm activities- are not well known. As indicated in the previous chapters, no systematic study has been conducted so far on how the farm households in PUAs have been integrated into the urban economy in Ethiopia in general and in Tigray in particular.

The peri-urban farm households possess meager resources and generate their income from diversified sources such as from productive sources (i.e. farm and nonfarm activities) and non-productive sources (i.e. unearned income sources). Most of the farm households are engaged in the farm sector although access to farmland is limited. But the attention given to them by government organizations or development agencies is limited. This is because the dispossessed farm households received land compensation which is not accompanied by any development packages that could help to improve the productive capacity of their meager resources which ultimately contributes to their food security and possible livelihood transitions.

Policies designed to improve the productive capacity of the peri-urban farm households and reduce peri-urban and urban poverty must consider the households consumption and production behaviour. In addition to liquidity and labour constraints, most peri-urban farm households face problem of asset fixity (i.e. owning irrigation canals, water wells and other farm implements) to shift their farm dominated skills and knowledge to urban labor market within a short period of time. This in turn can cause a differential effect on their welfare. Hence, the empirical chapters – six and seven – applied a unitary household model that takes in to account the specific features to investigate the causes of the differential effects. The next chapter, chapter five, investigated the effects of peri-urbanization on welfare of the rur-urban farm households.

Annex 4.1: Tropical Livestock Unit Indexes

Animal type	TLU index
Camel	0.1
Cattle	0.7
Sheep and goat	0.1
Horse	0.8
Mule	0.7
Donkey	0.5
pig	0.2
Chicken	0.01

Source: Adopted from Jahnke (1982)

CHAPTER 5: EFFECT OF URBANIZATION ON PERI-URBAN FARM HOUSEHOLDS WELFARE

5.1 Introduction

Urban expansion, in many developing countries, is taking place through the inclusion of nearby rural villages and is competing against the major productive asset (farmland) of the subsistence farm households in these villages (Chen et al., 2006a; Gregory and Mattingly, 2009). This form of urbanization likely affects the production and consumption patterns of the farm households in PUAs. In fact some studies indicate that the poor are likely to become more vulnerable and marginalized as a result of urban expansion (Gregory and Mattingly, 2009; Mattingly, 2009). Similarly, in Ethiopia, moving out of poverty is more difficult for urban poor than rural poor (Bigsten and Shimeles, 2008). These issues in turn indicate that urbanization induced poverty is likely to evolve in the peri-urban areas (PUA). But it merits empirical analysis to determine if such poverty occurs in the rapid urban expansion processes of developing countries.

Knowledge about the effects of peri-urban development (peri-urbanization) on welfare of subsistence farm households' in PUAs in developing countries is generally very thin. Few studies have investigated the effect of peri-urbanization on PU farmers' livelihood (Gregory and Mattingly, 2009; Mattingly, 2009) and income (Lanjouw et al., 2001; Mandere et al., 2010; Kasa et al., 2012). Gregory and Mattingly (2009) identify agriculture as a key source of livelihood for the PU farmers in Ghana and India. Using the same data, Mattingly (2009) suggests that promoting access to credit and provision of training to mitigate the difficulties of rural-urban livelihood transition. However, their methodology fails to clarify the rationale for selecting the study sites and how the training beneficiaries were selected. Hence, it is difficult to generalize the research findings to the wider population for the aforementioned reasons.

It is likely that land-related policies can have either positive or negative effects on the welfare of the peri-urban farm households (Mattingly, 2009). But developing countries have different land policies which again depend on the type of ownership such as public, community or private. In situations where land is owned by the

public, peri-urban land for urban expansion is appropriated by the local authority. This procedure disrupts the regular flow of income without the consent of the farm households in PUAs. For instance in Ethiopia land is owned by the public and the land policy grants compensation for the household (individual) when land is appropriated for investment purposes (FDRE, 2005). In cases like this, the farm households' physical asset (land) is replaced by a very liquid asset (money). Regardless of the temptation to consume the liquid asset, some households might not be able to benefit from the employment opportunities of the urban labor market and are trapped in poverty whereas they might be in a better position had they continued to practice farming. This differential effect could possibly depend on the farm households' initial asset possession.

This chapter addresses some of the knowledge gaps by analyzing the welfare of the farm households in PUAs using data from Tigray, Northern Ethiopia. The specific objectives of this chapter are to examine the effect of peri-urbanization on the welfare of farm households' by investigating their consumption expenditure and private asset holding. The main motive for examining asset holding of the farm households is to supplement the results of consumption since consumption data cannot be free from measurement errors (Dercon and Shapiro, 2007). The effect of peri-urbanization is investigated by contrasting average outcomes of the treated and non-treated groups using matching methods (Wooldridge, 2002; Cameron and Trivedi, 2005).

As discussed previously, analysis in this chapter depends on panel dataset collected from farm households in peri-urban areas of Tigray, Northern Ethiopia. The dataset consist of treatment and comparison (control) group where each sample unit has two observations in general and three observations on basic asset holding and demographic characteristics. Benefiting from the nature of the data, an extension of the "*difference-in-difference*" (DD)[43] method developed by Athey and Imbens (2006) is applied to measure magnitude of the urbanization effect on rur-urban farm household welfare.

[43] DD is a method used to measure the effect of an intervention when there exists *exante* and *expost* data for both participants and control groups (Cameron and Trivedi, 2005; Wooldridge, 2002)

The chapter is structured as follows. Section 5.2 reviews the different approaches employed to measure household welfare. In section 5.3, the estimation model and assumptions considered are presented and discussed. A description of the data and terms and definitions applied in the analysis are provided in section 5.4. Estimation results are discussed in section 5.5. The chapter ends with concluding remarks.

5.2 Measuring Household Welfare

Measuring household welfare is not a straight forward exercise as it has multiple dimensions of deprivation (Haughton and Khandker, 2009). Generally, there are two approaches regarding determination of the household's welfare status. One is the money-metric approach, the dominant approach benefiting from theoretical and methodological rigor, which tries to locate the poor by examining the poverty profiles in reference to a poverty line constructed using household consumption or income data (Atkinson, 1987; Ravallion and Bidani, 1994; Deaton, 1997). The other is the asset-based approach which evolves recently following the work of Carter and May (2001). However, the theoretical foundations of the asset-based approach depend on expected returns (income) of household assets.

The Cost-of-Basic-Needs (CBN) method is a money-metric approach and is based on details of expenditures on food and nonfood consumption. This method is the most commonly used to construct the welfare status (Ravallion and Bidani, 1994)[44]. In the CBN approach, consumption is the preferred proxy rather than income to examine household welfare or poverty status because the first is less noisy (i.e. has smaller variation) to approximate permanent-income hypothesis (Anand and Harris, 1994). Moreover, household consumption data is more reliable than income data

[44] According to Ravallion and Bidani (1994), the two standard methods to construct poverty profiles are cost-of-basic-needs (CBN) and food-energy-intake (FEI). The FEI approach depends on the level of consumption expenditure or income that can meet a pre-determined level of a person's food-energy-intake while the CBN method is based on the cost of a predetermined level of consumption expenditure for food and non-food items. In either approach, a poverty line is constructed based on the cost of the minimum basket of goods required for living.

particularly in developing countries[45] (Dercon and Krishnan, 1998). But household consumption data is not also free from measurement errors which could provide biased information on poverty transitions between two time periods (Deaton, 1997; Baulch and Hoddinott, 2000). In fact, Carter and Barrett (2006) argued that the usual poverty measures (money-metric) may be able to identify household's transitory poverty movements but cannot differentiate between structural and stochastic poverty transitions. Moreover, consumption-based welfare measures (though relatively more reliable than income-base measures) fail to distinguish whether consumption is based on asset depletion and asset accumulation (Zimmerman and Carter, 2003; Liverpool and Winter-Nelson, 2010).

Carter and May (2001) developed a theoretical model for asset-based measures of household welfare dynamics. Updating the same model, Carter and Barrett (2006) developed an analytical framework of the asset-based measures. However, the empirical challenge is to construct the asset poverty line where below that threshold the household (individual) can be considered poor (Carter and Barrett, 2006). So far, there is no uniform approach on how to set the asset-poverty line. Empirical studies that employ the asset-based approach use consumption data to generate the asset-poverty line (Adato et al., 2006; Liverpool and Winter-Nelson, 2010). This indicates that asset-based poverty measures are applied mostly to supplement money-metric poverty measures.

Other studies, following Filmer and Pritchett (1998), try to demonstrate how asset index[46] can measure household welfare in the absence of household expenditure/income data. For instance, asset index is used to predict children's school enrollment (Filmer and Pritchett, 2001), to estimate child health and nutrition

[45] Dercon and Kirshan (1998) extensively discuss the possible reasons why household expenditure data is more reliable than income data and defend why expenditure is a better proxy to measure welfare. Moreover, respondents may not be comfortable to reveal what they earn either because of some programs in the local administration (for instance respondents may understate for relief issues or overstate expecting some award) or cultural issues.

[46] Asset index, generated from household asset holdings, is a unit-less measure applied to aggregate household private asset holdings by attaching some weights derived using statistical tools known as principal component analysis, factor analysis, multiple correspondence analysis, etc.

(Sahn and Stifel, 2003) and to measure inequality (McKenzie, 2005). Collecting data on household assets may be economical and less susceptible to measurement errors compared to consumption data. But the nominal weights attached to aggregate the asset holdings hide details of asset quality and sometimes quantity depending how the index is aggregated. Hence, results generated from a unit less asset index may be difficult to interpret and could possibly fail to address nonlinearities and complementarities among the assets (Liverpool and Winter-Nelson, 2010).

Given the multiple dimensions of household deprivation, some empirical studies apply both money-metric (consumption/income) and non-money metric (assets) approaches jointly to validate which measure performs better to classify households' welfare. Baulch and Hoddinott (2000) applied non-monetary indicators of chronic poverty (such as child education and nutrition) to complement the monetary measures in Vietnam. Results from rural Ethiopia, by Liverpool and Winter-Nelson (2010), argue that asset-based welfare classifications perform better than consumption-based welfare classification in identifying households that likely fall into poverty. However, Liverpool and Winter-Nelson use average local market prices to aggregate the household's privately owned physical assets. But market values for some important assets such as housing are missing in rural Ethiopia. Given the methodological complexities of aggregating household assets, it is not easy to conclude that one approach is better than the other. Rather it could be advantageous to employ both approaches when the data allows which is the case in this study.

5.3 Framework of Estimation Model

Peri-urbanization, via the land policy, affects the entire population of the targeted villages. Like any other governmental or non-governmental social programs, peri-urbanization could be regarded as a policy intervention targeted at the lives of the peri-urban farm households. Empirical studies that focus on investigating the effect of social programs or interventions, generally, apply the families of "average-treatment-effect" (ATE) methods (Wooldridge, 2002; Cameron and Trivedi, 2005).

To assess the effect of an intervention, it is required to know the outcome of the treated household with and without the intervention. However, each household can either be targeted or non-targeted by the intervention. This means that for each household only one outcome can be observed and the other is missing data. In non-experimental studies, the general practice is to use control group to generate the missing data. The households in the control group are judged to be comparable to the treated households in all aspects except the treatment (intervention) and the data observed from the control group helps to approximate what would have happened to the treated group without the treatment (Cameron and Trivedi, 2005).

In the Ethiopian case of peri-urbanization, the likelihood for a household to dropout from the treatment is not an option due to the nature of the intervention. Hence, sample units in the control groups for such kind of policy intervention should be drawn from another peri-urban area that is not affected by the policy. Such kind of control groups are known as synthetic groups (Abadie et al., 2010). This means finding a comparable group that has similar characteristics to the entire population under the treatment but not affected by the treatment (policy intervention). Hence, as discussed in chapter three, the control group considered for the analysis satisfies the above-mentioned conditions.

The average treatment effects of an intervention can be assessed using methods such as matching methods, regression model or selection model. However, using matching methods have important advantages over the others. According to Stuart (2010), matching methods: i) are complementary to regression methods; ii) specify the regions where the distribution of covariates lack sufficient overlap between the treatment and control group (i.e. both regression and sample selection perform poorly in cases of insufficient overlap and their standard diagnostics lack the methods to check this overlap); and iii) have easy diagnostics to assess their performance. But perfect predictability of the matching index and ambiguity on how to select the conditioning covariates are the main drawbacks of the matching methods. Being cautious of the pros and cons, matching methods is adopted for the analysis in this study and ordinary least squares (OLS) for comparison purposes. A discussion of the formulation of the estimation model follows next.

To formulate the effect of peri-urbanization (treatment) on the farm household welfare, i.e. outcome of the treatment: let Y_{it}^{R} be welfare of household i at time t in the absence of peri-urbanization, i.e. the counterfactual welfare for the treated. Similarly, let Y_{it}^{U} is the i^{th} household welfare at time t under the treatment. Consequently, the welfare gain (or loss) as a result of peri-urbanization on the treated household can be expressed as

$$G_{it} = Y_{it}^{U} - Y_{it}^{R}. \qquad 5.1$$

However, it is impossible to observe both outcomes, Y_{it}^{R} and Y_{it}^{U} for the i^{th} household concurrently. This means G_{it} cannot be constructed because of missing data problem (Wooldridge, 2002). But the counterfactual welfare (Y_{it}^{R}) can be generated from the control group under some restrictive conditions[47].

To account for participation in the treatment, a dummy variable D_i is generated where $D_i = 1$, if the household is treated and $D_i = 0$, otherwise. The sample units have two observations of the outcome variable. For the sake of formulation let $t = 0$ and $t = 1$ represent observations before and after the treatment, respectively. The observed welfare for the treated farm household (farm household in the rur-urban village in this thesis) is defined as:

$$\boldsymbol{Y_{it}^{U} = Y_{it}^{R} + G_{it},\ (i = 1, \dots, n)} \qquad (5.\ 2)$$

where Y_{it}^{U} is the observed welfare and Y_{it}^{R} is the counterfactual welfare (i.e. welfare of the farm household in rur-urban villages had the farm household been continued farming its farmland and lives under rural administration). Therefore, in hypothetical situations, the expected effect of urbanization on the welfare of randomly selected farm households, which is also known as "*average treatment effect*", is specified as

[47]The restrictive condition is known as ignorability of treatment which means conditional on the observables, x, the outcome (y_1, y_0) is independent of the treatment, w, (Rosenbaum and Rubin, 1983). This implies that $E[y|w = 1, p(x)] - E[y|w = 0, p(x)] = E[y_1 - y_0|p(x)]$ which is the average treatment effect conditional on *pscore*, p(x).

$$\boldsymbol{E(G) = E(Y^U - Y^R)}. \quad (5.3)$$

Similarly, the average effect of peri-urbanization on welfare of the farm households in the rur-urban villages, i.e. known as the "*average treatment effect on the treated*", is given as:

$$E[(Y^U - Y^R)|D = 1] \quad (5.4)$$

If the treatment is completely randomized, then *average treatment effect* and *average treatment effect on the treated* are identical: $E(G) = E(Y^U - Y^R) = E[(Y^U - Y^R)|D = 1]$ (Wooldridge, 2002: p605). But this is not the case in most social experiments due to selection bias which can be caused by observed and unobserved factors.

Other than the treatment, welfare can be affected by factors specific to the household (X) known as confounding factors. Hence, the average effect of peri-urbanization on the rur-urban farm household's welfare conditional on observed covariate or confounding factors is defined as:

$$\boldsymbol{E[(Y^U - Y^R)|X, D = 1] = E(Y^U|X, D = 1) - E(Y^R|X, D = 1)} \quad (5.5)$$

The second term on the right hand side of equation (5.5) is expected welfare of the farm households in rur-urban villages had they not been under urban administration which is the counterfactual welfare. This is not possible to observe but can be generated by applying the conditional independence assumption (CIA). Heckman et al. (1998) argued that the CIA implies "*conditional on covariates (X) non-participant outcome have the same distribution that participants would have experienced had they not participated in the program*". This implies that, by controlling variables (covariates) that influence welfare, the counterfactual welfare of rur-urban farm households can be approximated by welfare of the rural farm households (control group).

Matching by controlling covariates might be difficult when the number of variables that influence the outcome is large. Hence, Rosenbaum and Rubin (1983) propensity score matching method is applied to overcome the problem of curse of dimensionality. This process produces predicted probabilities of all observations

which in turn help to create comparable groups where agents with similar propensity scores are considered as matches (Heckman et al., 1998). Hence, the propensity score is generated by:

$$\boldsymbol{P(X_i) = Prob(D_i = 1|X_i)} \quad (5.\ 6)$$

where $P(X_i)$ is the conditional probability of participation given pre-intervention household-specific factors, X_i. $P(X_i)$ is also known as propensity score (*pscore)* and can be estimated using discrete choice model. But it is imperative to select appropriate covariates that satisfy the CIA condition in estimating the *pscore*.

To estimate the *pscore*, the literature recommends to select variables that can affect participation and outcome but unaffected by participation. This means these variables should have to be either time-invariant or observed before the intervention (Caliendo and Kopeinig, 2008). After the propensity score (*pscore*) is estimated, the next step is to find best matches from the control group whose *pscores* are sufficiently close to the treated but with restricted overlapping (i.e. common support) conditions of $0 < P(X_i) < 1$ (Cameron and Trivedi, 2005). The common support condition is a necessary condition for matching estimators to identify and consistently estimate the average treatment effect of the intervention[48].

Observations in both groups are likely to reduce due to the common support condition. Let this sample be represented by θ which is a sub-sample of the total observations. So, the average treatment effect on the treated in the region of common support[49] is specified as

$$E[(Y^U - Y^R)|P(X), D = 1] = E[Y^U|P(X), D = 1, \theta] - E[Y^R|P(X), D = 0, \theta] \quad (5.\ 7)$$

[48] The matching procedure is all about finding the best possible match for the treated observations from the control group conditional on observed characteristics. The common support restriction helps to find the closest match for each rur-urban household from the rural households.

[49] Imposition of the region of common support criteria could likely throw away observations because the objective is to find the best match as much as possible. Hence, observations outside the region of common support will be automatically excluded from the analysis.

Although matching eliminates bias due to observable differences, it is possible that household welfare to be affected by unobserved differences of the household such as preferences in consumption goods. Consequently, the model in equation (5.7) has to be modified to control such kind of unobserved bias.

A set of criterion might have been applied by the respective urban administration to decide which way the town should expand or which rural village should be incorporated to the urban administration. Such decisions could possibly depend on the availability of social and economic infrastructures (such as market, road, school, health service and other facilities) in order to utilize the scale of economies of the existing infrastructures. This indicates that administration of the treatment is not completely random though participation in the treatment does not have self-selection problem. These initial latent conditions of the peri-urbanization decision are time-invariant and can be sources of unobserved selection bias (Heckman, 1989; Heckman, 1990; Ravallion, 2005). The DD method is among the instruments used to remove such sources of time-invariant selection bias (Heckman et al., 1998; Galasso and Ravallion, 2004; Ravallion and Chen, 2005).

Application of DD method requires observations, before and after the intervention, for the outcome variable as well as the factors that affect the outcome variable. However, this study has dataset of *ex-post* observations of household welfare (i.e. the first observation was made about five years after the intervention and the second observation a year later) and with *pre* and *post* intervention observations on household demographic composition and basic asset holdings details such as farmland, livestock, housing and durable goods. As a result, the DD method cannot be applied. Instead the model in equation (5.7) is modified to estimate the outcome of interest. Accordingly, the effect of peri-urbanization on the rur-urban farm households' welfare over time in the region of common support is defined as:

$$\boldsymbol{E}(\Delta \boldsymbol{G}) = \boldsymbol{E}\left[(\boldsymbol{Y_{i1}^{U}} - \widehat{\boldsymbol{Y_{i1}^{R}}}^{*}) - (\boldsymbol{Y_{i0}^{U}} - \widehat{\boldsymbol{Y_{i0}^{R}}}^{*}) | \boldsymbol{P}(\boldsymbol{X_i}), \boldsymbol{D_i} = \boldsymbol{1},\ \boldsymbol{i} \in \boldsymbol{\theta} \right] \qquad (5.8)$$

where Y_{i1}^{U} and Y_{i0}^{U} are observed welfare for the treated groups for two consecutive years, respectively; $\widehat{Y_{i1}^{R}}^{*}$ and $\widehat{Y_{i0}^{R}}^{*}$ represent estimated counterfactual welfare of the rur-urban farm households generated from the control group. Model (5.8) combines matching with DD methods and is used to control time constant unobserved effects.

5.4 Data and Summary Statistics

5.4.1 Data, Terms and Definitions

The sample units in the treatment as well as the control group are farm households who practice subsistence farming and located adjacent to the urban centers. This ensures that both groups are drawn from similar socio-economic environments. Only data details relevant to this chapter are presented and discussed because general data description is illustrated in chapter four of this thesis. The analysis presented in this chapter mainly depends on consumption expenditure and pre-intervention (*ex-ante*) observables (or variables) data of the farm household. The pre-intervention variables consist of demographic composition, education and possession of assets such as farmland in *tsimdi*, livestock (i.e. only type and quantity) and housing (i.e. number of rooms).

Real annual household expenditure, which is constructed previously, is adjusted for sex and age composition of the household. Per adult instead of per capita units are adopted for the analysis because the latter has the potential to overstate the consumption expenditures of a household with more children. Conversion indices developed by Dercon and Krishnan (1998) are used to aggregate household consumption expenditure and details are given in Annex 5.1. Moreover, *ex-ante* household asset holdings such as land, livestock and housing are corrected for age and sex composition of the household and expressed in per adult equivalent. But it is important to note that per adult units cannot fully capture the economies of scale gained from the joint consumption of goods such as housing services and durable goods in the household.

The distributions of pre-intervention variables (covariates) are presented in Table 5.1. It is observed that most covariates of the treatment and the control groups have similar distributions. But both groups have also significant differences in a number of covariates. The rur-urban households have older heads than rural farm households. The rur-urban farm households have more old aged members and more number of rooms per adult compared to their rural counterparts.

Table 5.1: Sample means and standard errors of pre-intervention covariates

Variable definition	Treatment Mean (Std.)	Control Mean (Std.)	Difference Mean (Std.err)
Household head age	50.59 (1.53)	43.53 (13.52)	-7.06 (1.33)***
Number of adults	3.02 (1.69)	2.84 (1.51)	-0.17 (0.15)
Number of children below 15 years old	2.15 (1.75)	2.33 (1.77)	0.18 (0.16)
Number of adults above 65 years old	0.24 (0.49)	0.07 (0.27)	-0.17 (0.04)***
Livestock in tropical units (TLU) per adult	0.80 (0.85)	0.77 (0.85)	-0.08 (0.07)
Farmland in *tsimdi* per adult	1.00 (0.98)	1.02 (1.07)	0.01 (0.09)
Number of rooms per adult	0.72 (0.81)	0.65 (0.70)	-0.32 (0.06)***
Female headed households (%)	0.30 (0.03)	0.26 (0.03)	-0.04 (0.04)
Household head farming main job (%)	0.62 (0.03)	0.69 (0.03)	0.07 (0.04)
Household head level of literacy:			
Illiterate (%)	0.60 (0.03)	0.55 (0.03)	0.05 (0.05)
Adult literacy and church school (%)	0.80 (0.02)	0.10 (0.02)	0.02 (0.03)
Completed grade 1-4 (%)	0.13 (0.02)	0.17 (0.02)	0.04 (0.03)
Completed grade 5 plus (%)	0.19 (0.03)	0.18 (0.02)	0.00 (0.04)
Sample size(N)	240	238	

Note: Std. stand for standard deviations, Std.err represents standard errors and *** means significant at 1%.

In 2011, average real consumption expenditure of the rur-urban households was significantly higher than the rural households (Table 5.2). After a year, however, real consumption expenditure for the treatment group became significantly lower than that of the comparison group. Similarly, between 2011 and 2012, consumption expenditure of the treatment group decreased while it increased for the comparison group. This seems that, on average, welfare of the rural households as measured in consumption expenditure has improved over a year while that of rur-urban farm households' has reduced. This signals that welfare of the farm households in the rur-urban might be systematically affected by treatment (i.e. peri-urbanization) instead of the differences in other observables factors.

Table 5.2: Mean and Standard error of consumption expenditure

	Treatment			Control			Difference-in difference
	2011	2012		2011	2012		
Expenditure in 000 ETB	Mean	Mean	Difference	Mean	Mean	Difference	
Real expenditure per adult	4.24	3.93	-0.78	3.42	4.07	0.16	-0.96
	(1.92)	(1.77)	(0.16)***	(1.52)	(2.06)	(0.18)	(0.20)***
Real food expenditure per adult	3.42	3.15	-0.46	2.96	3.42	0.29	-0.76
	(1.55)	(1.38)	(0.13)***	(1.31)	(1.77)	(0.15)	(1.68)***
Real non-food expenditure per adult	0.83	0.78	-0.32	0.49	0.66	0.13	-0.20
	(0.71)	(0.61)	(0.05)***	(0.40)	(0.56)	(0.06)**	(0.06)***
Sample size (N)	240	236		238	227		

Note: figures in parenthesis indicate standard deviations except in the last column which are standard errors. *** significant at 1% and ** significant at 5%.

Availability of basic infrastructures such as school, market, road and health centers in the sub-villages are important to ensure if the two groups are comparable. Although no data for these amenities before the intervention, the data after intervention is used to address the issue. The distance to the services[50] such as market, school, health clinic and basic veterinary service is less than an hour in 2011, except in Mekelle, on average (Table 5.3). The difference in mean of time travel to the services is statistically significant, where the travel time for the rur-urban households is shorter than the rural ones.

The rural households are a little far away from the service stations particularly from the secondary schools. This is not a surprising result because generally urban people travel shorter time to access the services compared to the rural people. Although the travel time is longer for the rural households, it is also important to note that the differences in the travel time are less than half an hour except that of the secondary school in Mekelle. In fact most of sub-villages in the control group become under urban administration in 2012, during the second survey, because of the town

[50] Elementary school (i.e. grades 1 to 4 and grades 4 to 8), health clinics, veterinary posts and *tabia* administration centers are usually located nearby separated by fence. Hence, distance to elementary school also represents distance to those amenities too.

expansion. This signifies that the sub-villages in the controls are in a situation where the sub-villages in treatment group were in 2006 which in turn ensures that they are suitable control groups.

Table 5.3: Distribution of walking distance in minutes, single trip, to amenities in 2011/2012

	Mekelle		Adigrat		Axum		Alamata	
	Mean	Mean diff.	Mean	Mean diff.	Mean	Mean diff.	Mean	Mean diff.
To town center	85.49 (1.60)	18.14 (3.0)***	42.56 (1.92)	11.25 (3.8)***	31.15 (1.99)	23.33 (3.0)***	26.83 (2.03)	12.67 (3.8)***
To elementary school	20.51 (0.79)	3.74 (1.6)***	22.36 (1.40)	9.27 (2.6)***	23.84 (2.12)	25.90 (3.1)***	13.58 (1.14)	2.83 (2.3)
To secondary school	64.99 (2.58)	45.73 (4.3)***	49.66 (2.38)	15.23 (4.5)***	38.46 (2.61)	28.46 (4.1)***	31.67 (2.30)	23.67 (3.6)***
Obs. (N)	252		88		78		60	

Note: mean represents the average travel time required in the peri-urban. Mean diff. represents the difference in mean travel time between rur-urban and rural households. ***, **, and * represents significance levels at 1%, 5% and 10%, respectively.

5.5 Estimation Results and Discussion

5.5.1 Propensity Score

To estimate the effect of a treatment, it is necessary to ensure that the households in the treatment and control groups have similar distributions in their observable characteristics (covariates) unaffected by the treatment (Heckman et al., 1998). This condition assures that the covariates included in estimating the propensity score (*pscore*) should not be contaminated with the treatment or anticipation of the treatment. Hence, in order to ensure this condition, the pre-intervention covariates are used to estimate the *pscore* (Dehejia and Wahba, 2002; Caliendo and Kopeinig, 2008).

The pre-intervention observables are factors associated with household welfare which consists of the household's demographic composition and asset holding and the local environment. The household head is assumed to be influential in the consumption decision of the household. The household head's age, sex, main job and education status are considered as a result. Family size is directly linked to consumption expenditure. To capture the effect of the household's production capacity on consumption expenditure, asset ownership (such as farmland, livestock and housing) and location of the household are included in the model. Presumably, keeping other factors constant, households with higher asset holdings likely have higher consumption expenditure and vice versa. Similarly, the household's production behavior is likely influenced by the local environment which is represented by the towns.

A *logit* model is regressed on the above-mentioned pre-intervention covariates. The parameter estimates of this regression are not interpreted because urbanization affects all farm households in the targeted villages where decision to participate is not an issue. But this procedure is necessary to generate the *pscore*. The *pscore* is used to create best matches between the treatment and the control groups conditional on sharing similar pre-intervention covariates. This does not mean that there is an exact match between *pscores* of the treatment and control groups since getting identical values is difficult but matching is done using local averages created by grouping the *pscores* into stratum (Wooldridge, 2002: 620).

The estimation outputs of logit regression indicate that most variables are insignificant (Table 5.4). But few variables such as age of the household head and number of adults above 65 years old are strongly significant. Similarly, the main job of the household head and number of adult in the household are weakly significant. The significant coefficients indicate that the treatment and control group are different with respect to the corresponding covariates. These results are similar to the summary statistics presented in Table 5.1. However, these covariates could be sources of observables bias and should be corrected before estimating the average treatment effect.

Table 5.4: Logit regression estimation results

Variable	Coefficient	Std. Err.
Female headed households (yes=1)	0.34	0.25
Household head age	0.03***	0.01
Household head literate (yes=1)	0.25	0.22
Household head farming main job (yes=1)	-0.43*	0.24
Number of adults	0.12*	0.07
Number of children below 15 years old	0.04	0.06
Number of adults above 65 years old	0.89***	0.34
Farmland in *tsimdi* per adult	-0.19	0.13
Livestock in tropical units (TLU) per adult	-0.01	0.12
Number of rooms per adult	0.28	0.18
Location: base category Alamata		
Mekelle	0.02	0.31
Adigrat	-0.18	0.38
Axum	-0.08	0.38
Constant	-1.73***	0.58
Sample size (N)	454.00	
Psuedo-R^2	0.07	
LR χ^2	43.63	
Log-likelihood	-292.76	

Note: Due to missing values of some variables, the sample size used for the regression reduced to 454. *** significant at 1%, ** significant at 5% and * significant 10%.

Identifying suitable comparable groups with substantial overlap in the covariates distribution is a condition to estimate average treatment effect on the treated (ATT). Hence, following the logistic regression, the common support condition was imposed to ensure that the treatment and control group are similar in observed features. As a result five optimal blocks with the same mean *pscores* for both treated and control groups in each block are identified. The region of common support is created in the range of [0.20, 0.95]. Similarly, the quality of overlap was checked by using graphical diagnosis of the covariates distribution (see Figure 5.1). Figure5.1 provides a simple diagnostic on the estimated *pscores* before and after matching. Panel (b) of Figure 5.1 indicates that *pscores* of both groups are substantially overlapped and few observations from the treatment groups are left unmatched. A

caution is that *pscore* of the control group is distributed asymmetrically around the *pscore* of the treatment group.

The purpose of estimating *pscore* is to select matches that closely resemble the characteristics of farm households in the rur-urban villages. But *pscore* is a continuous variable which means it is impossible to get matches with the same *pscore* (Becker and Ichino, 2002). The literature recommends different matching methods that overcome this problem but the most commonly applied methods include *nearest neighbor, kernel* and *stratification* matching. In general, one method is not preferred over the other. But when *pscores* of the control groups are distributed asymmetrically around the treatment group *local linear* matching – a version of the *kernel* matching- has an advantage over the others (Caliendo and Kopeinig, 2008).

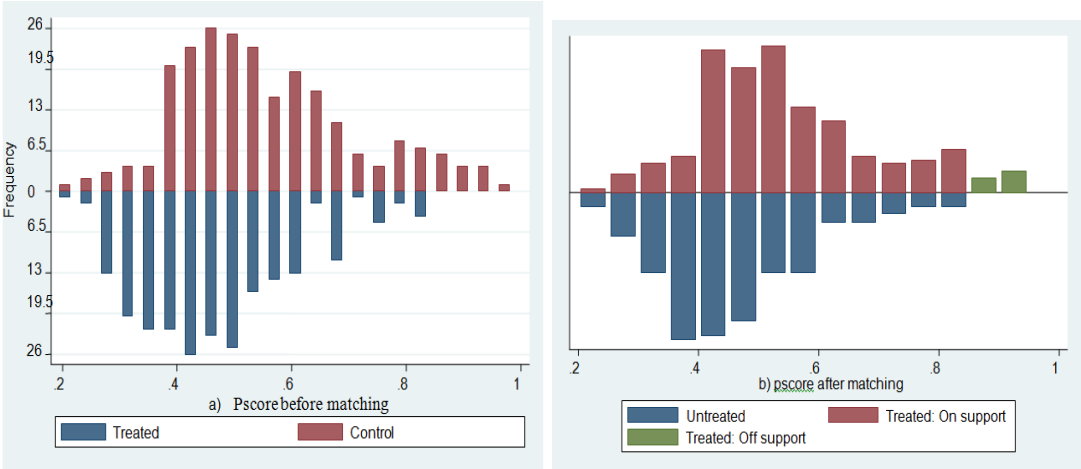

Figure 5.1: distribution of propensity score (*pscore*) before and after matching

As noted above, distribution of the relevant pre-intervention covariates was balanced on the basis of estimated *pscore.* However, conducting further test is recommended to confer robustness of the estimation and matching is also conducted without considering the stratum. The result of balancing tests of the covariates distribution before and after matching is provided in Table 5.5. The standardized mean deviation of the *pscore* was about 9.5% before matching and is reduced 3.7 - 2.3% after matching except in the case of the local linear methods which increased to 10.4%.

This indicates that the estimation results are sensitive to selection of the matching algorisms. After matching, the pseudo-R^2 decreased from 7.6% before matching to 0.4% after matching and p-value of the likelihood ratio tests become insignificant after the matching. These tests ensure that proposed model reasonably identifies the *pscore* in terms of distribution of the covariates between the treatment and control groups.

Table 5.5: Matching quality indicators

Matching Algorithm	Pseudo-R^2 before	Pseudo-R^2 after	LR χ^2 (P-value) before	LR χ^2 (P-value) after	SMD before	SMD after
LLM[A]	0.0759	0.023	47.58 (0.001)	14.26 (0.58)	9.5	5.4
KM[B]	0.076	0.004	47.58 (0.001)	2.33 (1.00)	9.5	3.7
NNM[C]	0.076	0.004	47.58 (0.001)	2.46 (1.00)	9.5	2.3

Variables included in psmatch2 stata command are: hhsex98 hhage98 hhage2 hhedu98 hhjob98 hagb nadult98 nchildb1598 hhadt2 nadult6598 pfland98 ptlu98 proom98 mekelle adigrat axum (definition of variables is provided in Annex 5.3)

(A) represents local linear matching with band width 0.01, *biweight* weighting and common support.

(B) represents kernel matching with band width 0.04, *biweight* weighing and common support.

(C) represents ten nearest neighbor matching with replacement, caliber 0.03 and common support.

5.5.2 Estimation of Average Treatment Effect

The regression outputs of ordinary least squares (OLS) are reported in (Table 5.6). Although values of the treatment estimates are different, the sign and significance level of the point estimates of OLS are similar to the outputs of matching within stratum estimates. The single difference (i.e. equation 5.7) and the double difference (i.e. equation 5.8) matching estimation outputs are presented in Table 5.7. The *kernel* and *nearest neighbor* matching methods have produced similar estimation outputs. The *local linear* matching method has produced larger estimation output. But the local linear matching method has the highest bias, which is slightly above 5%, compared to the other two (Table 5.5). The *nearest neighbor* matching estimation output has the lowest bias. For this reason, the discussion focuses on the estimation outputs of *nearest neighbor* matching. Discussions of the single and the

double difference estimation outputs of the average treatment effect on the treated are presented separately.

Single Difference

On average, the rur-urban farm households' welfare, as measured in terms of consumption expenditure, was significantly higher than the rural households in 2011 (Table 5.7). The estimation results suggest that the consumption expenditure of the farm households in the rur-urban is improved by about 900ETB due to peri-urbanization. About 60% of the effect is on food expenditure and the remaining 40% is on expenditures for consumable nonfood items. In general, the rur-urban farm households were in a better position in terms of consumption expenditure compared to the rural household in 2011. This could be a partial reflection of consumption bubble by the rur-urban households as a result of land compensation.

In 2012, however, the estimation result show mixed results. On average, food consumption expenditure of the rur-urban farm households seems lower compared to that of the rural households but not statistically insignificant. The effect on expenditures of nonfood consumable items is weakly significant which indicates that the rur-urban households' consume higher compared to the rural households'. But it should be noted that the rural households' expenditures on utility is underestimated because of having free access to alternative sources (for instance energy for cooking) or lack of access (for instance telephone services, drinking water). However, the total consumption expenditure of both groups is not significantly different which means on average both groups spend the same amount which indicates peri-urbanization has no effect on the rur-urban households' welfare. But comparing between 2011 and 2012, the results indicate that the purchasing power of the rural households catches up with that of the rur-urban households within a year. This indicates that the rural households are capable of meeting at least the existing level of consumption while maintaining or improving their asset base.

Double Difference

From the single period matching estimates, it is difficult to conclude what the effect of peri-urbanization is. However, the double difference matching estimation output shows that ATT is negative and strongly significant (Table 5.7). This indicates that, on average, the rur-urban farm households consume significantly lower compared to their rural counterparts. For instance, between 2011 and 2012, the rur-urban farm households' expenditure is decreased by about 1000*ETB* per adult. Out of this, the share of food consumption expenditure consists of about 78%. This in turn means that the poorest segment of farm households in the rur-urban villages are the worst affected.

In sum, the estimation results indicate that peri-urbanization negatively affects welfare of the rur-urban farm households. The following reasons might explain this scenario. The first reason could be because of change in the production behavior of the rur-urban farm households. As observed during the survey periods, most fields in the rur-urban villages were under farming activities in 2011 and a year later in 2012 these fields became a very active construction sites for nonfarm purposes. Secondly, the high consumption expenditure in 2011 could be a reflection of spending the land compensation money because land compensation was mostly given between 2007 and 2009. Thirdly, the farm households might be less motivated to save the liquid asset in banks because the real value of saving is negative for the fact that interest rate in the banks was about 5% while inflation rate was about 33% in 2011 (Geiger and Goh, 2012). The other reason could be the presence of high inflation rate severely affected consumers rather than producers. This is because the rur-urban farm households spent about 80 percent of their consumption expenditure on food (see Table 5.6) and most of these households purchase the major food items, i.e. cereals and pulses (see Table 4.5).

Table 5.6: Ordinary least squares (OLS) estimation outputs of the treatment effect

	Real food expenditure per adult		Real nonfood expenditure per adult		Real total expenditure per adult	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Year 2011						
Treatment	463.99	201.54**	459.46	99.32***	923.45	279.96***
Peri-urban Mekelle (rur-urban=1)	120.41	221.10	-56.02	121.09	64.39	309.88
Peri-urban Adigrat (rur-urban=1)	-177.88	370.07	-343.44	115.52***	-521.32	426.49
Peri-urban Alamata (rur-urban=1)	-294.38	334.90	-384.73	131.95***	-679.11	431.53
Constant	2962.25	85.14	497.54	26.15	3459.80	98.61
R-squared		0.03		0.10		0.06
Obs.		478		478		478
Year 2012						
Treatment	144.12	295.38	206.96	102.81**	351.07	359.91
Peri-urban Mekelle (rur-urban=1)	-511.94	287.89*	-135.59	106.57	-647.53	353.57*
Peri-urban Adigrat (rur-urban=1)	-549.44	372.99	64.22	178.25	-485.22	487.28
Peri-urban Alamata (rur-urban=1)	-458.51	400.12	-161.52	147.37	-620.03	507.31
Constant	3424.07	118.20	657.54	37.11	4081.61	137.54
R-squared		0.02		0.02		0.01
Obs.		459		459		459
Difference in 2011 and 2012						
Treatment	-282.86	271.03	-269.31	92.91***	-552.17	305.01*
Peri-urban Mekelle (rur-urban=1)	-684.42	284.12**	-66.52	110.10	-750.93	326.80**
Peri-urban Adigrat (rur-urban=1)	-503.25	487.12	412.80	165.97***	-90.45	544.18
Peri-urban Alamata (rur-urban=1)	-197.00	358.96	235.33	110.68**	38.33	404.73
Constant	457.68	117.19	164.67	38.87	622.35	128.45
R-squared		0.05		0.06		0.07
Obs.		459		459		459

Note: ***, **, and * represents significance levels at 1%, 5% and 10%, respectively.

Table 5.7: Impact of urbanization on rur-urban farm households' welfare

Year	Matching Algorithm	N. treatment	N. control	Real food expenditure per adult		Real non-food expenditure per adult		Real total expenditure per adult	
				ATT	Std. Err.	ATT	Std. Err.	ATT	Std. Err.
In 2011 (single Difference)									
	LLM[A]	169	222	375.95	193.43***	341.66	74.55***	717.61	253.31***
	KM[B]	186	221	440.81	177.86***	376.71	68.63***	817.37	211.91***
	NNM[C]	181	221	460.14	178.47***	376.23	69.46***	836.37	185.92***
In 2012 (single Difference)									
	LLM[A]	173	222	-426.12	219.90**	175.59	79.79**	-249.55	261.81
	KM[B]	186	221	-324.85	204.66**	197.33	73.83**	-127.52	244.79
	NNM[C]	181	221	-362.98	201.15*	196.29	76.18*	-166.67	241.52
Between 2011 – 2012 (Double Difference)									
	LLM[A]	173	222	-773.29	247.16***	-171.92	91.11***	-945.20	278.08***
	KM[B]	186	221	-765.65	238.65***	-179.23	85.96***	-944.88	261.52***
	NNM[C]	181	221	-823.11	235.85***	-179.93	86.67***	-1003.04	261.41***

Note: significance levels at 1%, 5% and 10% are represented by ***, **, * respectively. Variables included in *psmatch2* stata command are: hhsex98 hhage98 hhage2 hhedu98 hhjob98 hagb nadult98 nchildb1598 hhadt2 nadult6598 pfland98 ptlu98 proom98 (definition of variables is provided in Annex 5.3)

A: represents local linear matching with *biweight* weighing, band width (0.05) and common support

B: represents kernel matching with *biweight* weighing and band width (0.04)

C: nearest neighbor matching with replacement, neighbour(10), caliper(0.03) and common support

5.6 Conclusion

This chapter illustrated the effect of peri-urbanization on welfare of the farm households in rur-urban villages using a difference-in-difference propensity score matching methods. The results have shown that peri-urbanization diminished the consumption expenditure as well as physical asset, i.e. livestock and farmland, ownership of the farm household in rur-urban villages. The size of farmland is reduced due to the nature of peri-urbanization because the peri-urban farmland is appropriated for nonfarm activities. In subsistent farming community, livestock ownership is positively associated with ownership of farmland because livestock serves as the main the source of draft power (e.g. to plough, to thresh, etc) for farming activities.

Consumption of expenditure of farm households in the rur-urban villages, on average, was significantly higher in 2011 compared to their rural counterparts but in 2012 no significant difference was observed. However, consumption expenditure of the rur-urban farm households has significantly reduced between 2011 and 2012. The consumption bubble in 2011 may partially reflect the use of land compensation to cover consumption expenditures which in turn indicates consumption based on asset-depletion. The other reason could be the high inflation rate in 2011 and also in 2012 might negatively affected the purchasing power of the consumers. Hence, the reduction in consumption expenditure could be the results of combined effects of high inflation rate and lack of resources to finance it.

It can be generalized that the rur-urban farm households' consumption expenditure and asset base has diminished over time. This in turn indicates the rur-urban farm households would have been in a better condition had they been continued farming and getting the privileges that that their counterparts have.

The negative effect of peri-urbanization on consumption expenditure of the rur-urban farm households concurs with other similar studies and may signal the gradual development of urban-induced poverty in the peri-urban areas. But it should be noted that the consumption-based (objective) measurement of welfare reflects the partial picture of household welfare because it address only the households' level of food deprivation. It merits investigating the factors that affect both subjective and

objective measure of welfare changes of the rur-urban as well as rural households in order to understand whether the contributing factors are different for both groups. This issue is further dealt in chapter six of this study.

Annex 5.1: Adult Equivalent Scales

Years of age	Men	Women
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-10	1.04	0.80
30-60	1.00	0.82
60 plus	0.84	0.74

Sources: Adopted from Dercon and Krishnan (1998)

Annex 5.2: Covariates included in the estimation of propensity score

Variable name	**Definition**
hhsex98	Household head sex in 2006; dummy female=1, otherwise=0
hhjob98	Household head main job in 2006; dummy farming=1, otherwise=0
hhage98	Household head age in 2006
hhage2	hhage98 squared
hagb	an interaction term for hhjob98 and hhage98
nadult98	Number of adults in the household in 2006
nchildb1598	Number of children below age 15 in the household in 2006
nadult6598	Number of adults age 65 plus in the household in 2006
hhadt2	nadult6598 squared
pfland98	Household farmland ownership in tsimdi in 2006 per adult
ptlu98	Household livestock ownership in TLU in 2006 per adult
proom98	Number of rooms owned by the household in 2006 per adult
Mekelle	Dummy for Mekelle town peri-urban, Mekelle=1, otherwise=0
Adigrat	Dummy for Adigrat town peri-urban, Adigrat=1, otherwise=0
axum	Dummy for Axum town peri-urban, Axum=1, otherwise=0
Alamata	Dummy for Alamata town peri-urban, Alamata=1, otherwise=0

Chapter 6: Determinants of Welfare and Vulnerability of Peri-Urban Farm Households

6.1 Introduction

In an effort to reduce poverty, many countries in Africa have been achieving a modest economic growth even at the time of global financial crises. This growth is accompanied by continuous and rampant urban expansion. As a result, many hectares of farmlands that belong to the peri-urban subsistence farmers in the nearby villages have become the immediate targets in the process. Such kind of urban expansion process disrupts the regular flow of income (agriculture income) of peri-urban farm households. Some farm households might possibly experience a decline in welfare and become vulnerable as a result. Hence, examining the underlying factors that can help to better understand the linkages between economic growth and poverty reduction in the context of urban-rural continuum and to provide insights that go beyond what is known as urban or rural poverty literature.

Empirical studies on peri-urban areas[51] of East African countries indicate that the nonfarm sector appears to be an important route to escape from poverty (Lanjouw et al., 2001; Mandere et al., 2010). On the other hand, other studies indicate that poor farmers have limited access to the lucrative activities of the nonfarm sector in the rural economy (Dercon and Krishnan, 1996; Barrett et al., 2000; Woldehanna and Oskam, 2001). Moreover, initial asset holding and access to credit play a significant role for the farm household's transition to high-return nonfarm employments (Bezu and Barrett, 2012).

The prior studies make an important contribution in exploring farm households' differential access to the nonfarm sector in the rural economy context. These findings could be applied to cases where farm households tried to allocate their resources at their own pace, preference and rational thinking to supplement farm

[51] It is important to keep in mind that there is no universal definition for peri-urban areas which makes cross-country comparisons complex.

income and/or to smoothly transfer resources to the nonfarm sector. However, farm households in peri-urban areas might engage in the urban labor market not necessarily to allocate resources on the basis of their preferences rather it could be a reflection of distressed employment. This is because access to farmland is limited as a result of urban expansion. The desperate action of employment adjustment could result not only in marginalizing the very poor but also the relatively better-off farm households. This suggests that some rur-urban farm households are likely to move in and out of poverty over time as they try to adjust their means of living to the changing employment opportunities and challenges (Mattingly, 2009). On the other hand, empirical evidences in Ethiopia indicates that the likelihood of getting out of poverty is lower for the urban poor than the rural poor (Bigsten and Shimeles, 2008) which is a concern in itself.

Some developing countries such as Ethiopia, where land is owned by the public and in situations where provision of alternative land (farmland) is a difficult option, provide financial compensation to farmers when their land is appropriated for investment purposes. This kind of land policy overlooks, among other issues, the household's knowledge in utilizing the extremely liquid asset (money) which can possibly result in differential effects on welfare of the farm households. In fact, chapter five of this thesis shows that urban expansion negatively affects consumption expenditure of the dispossessed farm households and their asset ownership such as land and livestock. These issues signal that the farm households in peri-urban areas are becoming vulnerable. However, studies on determinants of welfare mobility of peri-urban farm households are generally scarce.

This chapter aims to investigate the factors that affect peri-urban farm households' welfare and identify whether certain groups of farm households are vulnerable to urban expansion using data from peri-urban areas of Tigray, Northern Ethiopia. It mainly focused on identifying correlates of household welfare to shed light on factors that account for the household's vulnerability. It aims also to contrast the correlates of welfare of rur-urban with that of rural households. The analysis is based on the standard utility maximization model which assumed non-separable household model under imperfectly functioning input markets. A separate analysis is conducted for rur-urban and rural farm households because: i) rur-urban households'

farmland is replaced by money either partially or fully while the rural households still have their farmlands; and ii) the rur-urban and rural households fall under different administrations (urban and rural) in terms of policy implementation.

Both subjective and objective poverty measures are employed for the analysis. The main reason for applying both measures is because the consumption-based poverty measure is narrow which fails to capture other components of household welfare such as health and education (Deaton and Zaidi, 2002). Moreover, Bigsten and Shimeles (2011) argue that subjective measures of poverty have the potential to express other dimensions of household deprivations not captured by consumption-based measures. However, it should be noted that self-reported poverty measure could be biased because of the respondent's expectations and/or lack of clarity on baseline reference for ranking. Consequently, caution is required when considering inter-district or broader comparisons because it is not easy to distinguish whether the response is relative to local district (*woreda*) or broader contexts[52].

The chapter is structured as follows. In section 6.2, a theoretical model is presented to highlight the relationships between household consumption growth and factors internal and external to the household. The estimation strategy used is presented in section 6.3 by describing the variables included in the model and discussing why the specific models - Hausman-Taylor and multinomial logit models - are adopted to estimate the parameters of interest. Section 6.4 presents description of the dataset and definitions used in the analysis. Estimation results and discussions are provided in section 6.5. Concluding remarks are given in section 6.6.

[52] For instance, the respondent's terms of reference might be the locality, other districts or other regions in the country. Someone who is considered better-off in one locality could be considered poor in another locality and vice versa. Respondents might also have expectations of food aid or safety net program that they associate with the research. Such considerations are pertinent, even if efforts were made to explain the actual intended purpose of the research during the interview. These expectations and lack of clarity on references for ranking are likely to be potential sources of bias.

6.2 Empirical Framework

The rapid urbanization in most developing countries disrupts the usual means of income of farm households in peri-urban areas. Hence, urban expansion can be considered as a shock to the farm income. This shock ultimately affects the farm household's asset portfolio which is accompanied by adjustments to alternative employment options. The intentions of the farm household to adjust into alternate employment option could be to cope with and recover from the shock; or to maintain and enhance wealth. Hence, some households may easily offset the shock and fit in to the nonfarm sector smoothly while others may become more susceptible to poverty. As a result, some households may smooth their consumption by depleting their asset base (for instance saving) and then become vulnerable.

The effects of shocks on household welfare have been a concern of researchers and policy makers. The theoretical model of such studies anchors on the neoclassical growth model. Following Mankiw et al. (1992), the literature has extended the macro growth model and tried to identify correlate of household consumption growth by controlling factors related to initial household endowments, the local economy, shocks and government policies (see for instance Jalan and Ravallion, 2002; Deininger and Okidi, 2003; Dercon, 2004; Dercon et al., 2005).

Drawing on the work of Jalan and Ravallion (2002), household consumption growth is modeled under the utility maximization framework. The farm household in PUAs is assumed to produce combining labor and capital inputs under constant returns to scale. Capital and labor mobility are constrained because of either imperfect or missing markets. This assumption is not far from the truth in Ethiopia or in many developing countries because most markets are either missing or distorted. As a result, the production function exhibits diminishing returns to privately owned capital such as land and labor. The production function could also be influenced by external factors such as the local economy (i.e. diversity and scale of investments), shocks and policies (i.e. land and property compensation packages, public work programs). For instance in Ethiopia, in the presence of high inflation and missing markets for credit, the amount of land compensation received could matter for the farm household to make a viable investment(s) and to cover consumption expenditures as well.

Hence, the farm household is assumed to utilizes its production output for consumption, saving, investment and/or financing debt and maximizes inter-temporal additive utility. Applying Euler's equation that satisfies optimal rate of consumption growth and motivates growth rate that depends on household-specific and village-specific capital, the reduced empirical model in panel dataset structure can be formulated as (see derivation details in Jalan and Ravallion, 2002):

$$\Delta \boldsymbol{lnC_{it}} = \boldsymbol{\delta} + \boldsymbol{\beta}\Delta \boldsymbol{lnC_{it-1}} + \boldsymbol{\gamma}\Delta \boldsymbol{X_{it}} + \boldsymbol{\varphi A_{it-1}} + \boldsymbol{\alpha Z_{it-1}} + \boldsymbol{\varepsilon_{it}} \quad (6.\ 1)$$

where ΔlnC_{it} and ΔlnC_{it-1} represent current (t) and previous $(t-1)$ consumption growth rates of individual household (i) and $\delta, \beta, \gamma, \varphi,$ and α parameters to be estimated and δ represents the common source of change in consumption. The expression on the right-hand side consists of: time-varying (X_{it}) and time-invariant (A_{it-1}) household endowments; village specific constant variables (Z_{it-1}); and (u_{it}) is the composite error term consisting of unobserved household characteristic and idiosyncratic error term. The estimation strategy adopted and description of the variables included in the model is provided next.

6.3 The Estimation Strategy

6.3.1 Determinants of Growth in Consumption

The model in equation (6.1) is developed for observations observed for at least three time periods $(t = 1, 2, 3)$. For the case of two periods observations $(t = 1, 2)$, the lag in growth cannot be observed. So, equation (6.1) can be re-formulated as:

$$\Delta \boldsymbol{lnC_{it}} = \boldsymbol{\delta} + \boldsymbol{\beta}\Delta \boldsymbol{X_{it}} + \boldsymbol{\varphi A_{it-1}} + \boldsymbol{\gamma Z_{it-1}} + \boldsymbol{u_{it}} \quad (6.\ 2)^{53}$$

Current household consumption can be derived from equation (6.2), by applying some algebra, as:

[53] Equation (6.2) is similar to Mankiw et al (1992) and Islam (1995) growth empirics model employed to examine cross-country growth differences and to test the Solow growth model and existence of endogenous growth.

$$lnC_{it} = \delta + \beta X_{it} + \varphi A_{it-1} + \gamma Z_{it-1} + u_{it}, \quad t = 1, 2 \; and \; i = 1, 2, \ldots n$$

where $\boldsymbol{u_{it}} = \boldsymbol{\alpha_i} + \boldsymbol{\varepsilon_{it}}$ (6. 3)

The time-constant variables (A_{it-1}, Z_{it-1}) consist of household's initial endowments (both human and physical capital), shocks and geographical location. Head of the household is assumed to be influential in the household's production and consumption decisions. Hence, head's sex, age and education are considered. The physical capital is represented by the household's farmland ownership expressed in *tsimdi*. Data regarding ownership of durables and farm equipment are not included in the model due to missing data. This is because data on farm implements were not collected and house ownership is omitted due to lack of variation since almost all farm households own a house. It is also complex to interpret the result if an index is applied to aggregate the quality and quantity of houses that the household owns.

Urban areas in northern Ethiopia differ in the scale and type of investment they attract where bigger towns attract better investments due to scale of economies. Hence, farm households living in the peripheries of big towns possibly have better employment options due to the spill-over effect of economic activities and better output markets (specially for perishable agricultural products). Moreover, given the same sizes of farmland, farm households in the peripheries of larger towns are likely to receive a better amount of land compensation because of land price differences. This is mainly because land compensation is directly related to revenues of the respective urban administration[54] and level of investments in the location. Consequently, town dummies are used as proxies to the local economy in order to capture the fixed effects of differences in productivity of the household's own

[54] For instance in Mekelle, according to the discussions held with the urban administrators and available documents in the administration, the type of land compensation depends on the purpose and type of investments. If land is allotted for private investors, entitled farmers received only money as compensation on per square meter basis and the rate has been revised regularly (for instance the rate was 0.30ETB in 2006 and 0.75ETB in 2010 per square meter). If land is appropriated for housing associations, entitled farmers mostly received only a plot of land (usually 140 or 175 meter square) as compensation or minimum level of financial compensation.

capital (Jalan and Ravallion, 2002) and in access to product markets (Dercon and Krishnan, 1996).

Climate shocks, for instance drought, have a negative effect on farm household welfare (Dercon et al., 2005) and inflation has an adverse effect on urban households' welfare (Alem and Söderbom, 2012). Additionally, members of some households may find it difficult to be engaged in the existing employment opportunities due to idiosyncratic shocks such as health problems. Consequently, additional variables are included to account for shocks related to employment and the health situations of household members.

The time varying variables (X_{it}) include the household head's main job, income composition indexes and livestock holding. Livestock is expressed in monetary value (i.e. ETB) in constant prices with 2010 as base year. Livestock holding is expected to change over time because draft-power animals (such as oxen) may not be important in PUAs and could be replaced by dairy cows or other livestock. Similarly, farm households in Northern Ethiopia diversify their income sources to reduce vulnerability and accumulate assets (Woldehanna and Oskam, 2001). For this reason, income composition indexes of the household are incorporated in the model as a proxy for the household's ability to adjust into the changing employment options (Grootaert et al., 1997). Hence, depending on availability of employment options, contributions of income sources to the total income of the households are expected to vary over time.

Farm households are expected to be different in their production process and consumption behaviors which is difficult to observe fully. Similarly, the household's welfare might be affected by unobserved factors related to the local economic activity. These unobserved household and geographic factors could be correlated with some of the regressors. Hence, the ordinary least squares (OLS) model will be biased if applied to estimate the parameters in model 6.3.

The individual specific effects model - fixed effect - is the remedy to correct the unobserved correlation and heterogeneity. Parameter estimates of the fixed effect model (FE) are consistent even in the presence of correlation between the error term and the explanatory variable(s) but not the estimates of the random effect model

(Wooldridge, 2002: 266). But FE cannot identify the effects of time-invariant variables that represent the household's initial capital endowment, geography and policy which are pertinent to this study. Hence, RE model is the option to estimate the parameters of interest but should be based on specification test results of Hausman test, i.e. a statistical test conducted to determine if the individual effects are random or RE model is consistent.

The farm household's response to the emerging urban employment options is expected to depend on initial capital endowments (Deininger and Okidi, 2003). This suggests that the household's income composition indexes are endogenous and likely to be correlated with unobserved factors such as household's ability and motivation. Hence, RE model likely produces biased estimates if applied. Given some regressors are endogenous, model 6.3 can be rewritten as:

$$lnC_{it} = \delta + \beta_1 X_{it1} + \beta_2 X_{it2} + \varphi A_{it-1} + \gamma Z_{it-1} + \alpha_i + \varepsilon_{it} \qquad 6.4$$

where $= (\beta_1, \beta_2)$, $X_{it} = (X_{it1}, X_{it2})$, X_{it1} represents time-variant exogenous variables while X_{it2} represents time-variant endogenous variables possibly correlated with latent household specific effect (α_i) but not with random error ε_{it} (i.e. ε_{it} is identically and independently distributed with mean zero and constant variance). This implies that $E(\alpha_i|X_{it2}) \neq 0$ which causes bias.

To circumvent the bias, i.e. to estimate consistent and efficient parameters, Hausman and Taylor (1981) propose a two-step estimation approach. The first step is to transform model 6.4 by multiplying $\Omega^{-1/2}$ where Ω is the variance-covariance matrix of the composite error term $\alpha_i + \varepsilon_{it}$. Then conduct two stage least square (2SLS) regression on the transformed model using set of instrumental variables which consists of the within transformation matrix and the exogenous variables (Hausman and Taylor, 1981; Wooldridge, 2002)[55]. The main advantage of the Hausman and Taylor (HT) model is that it does not require using instrumental variables not included in the model (Verbeek, 2004). Efficiency of HT model

[55] HT model is different from the usual instrumental variables model. For details of the derivation, see Hausman JA, and Taylor WE. (1981). Panel Data and Unobservable Individual Effects. *Econometrica: Journal of the Econometric Society*, 1377-1398.

estimates depends on its identification which means the number of exogenous regressors should be at least equal to the number of endogenous regressors (Hausman and Taylor, 1981; Wooldridge, 2002).

6.3.2 Poverty Transitions and Determinants

Urban expansion is land intensive and implicitly limits the farm households' diversification into farm sector. But it might induce the farm households to intensify their employment into the secondary and tertiary production activities. In an attempt to fit into urban labour market, the farm households in peri-urban area are likely to move in and out of poverty. Hence, it is important to identify factors that affect changes in poverty situations of these farm households. For this purpose, objective and subjective poverty indicators of the farm household are employed in the analysis.

The objective poverty indicator is a binary variable and is generated using the regional poverty line developed by Ministry of Finance and Economic Development Ethiopia (MoFED, 2012)[56] as a reference. The MoFED poverty line is constructed on the deprivation level of the household computed based on cost-of-basic-needs (CBN) approach (Ravallion and Bidani, 1994)[57]. Hence, an indicator of the household's objective poverty level is constructed in reference to the MoFED's poverty level. However, the subjective poverty measure refers to an indicator of poverty as perceived by the household which possibly captures other aspects of the household deprivation other than consumption per se.

Poverty indicator (P_i), for both objective as well as subjective, of the i^{th} household has binary value (i.e. $P_i = 1$, if the i^{th} is household not poor and P_i=0, otherwise). Hence, change in household poverty status (ΔP_i) is defined as the difference in the

[56] MoFED reported a new poverty line with December 2010 baseline by updating the 2006 poverty line (for details see MoFED, 2012).

[57] The cost-of-basic-needs (CBN) method, which consists of expenditures on food and non-food consumables, bases on the cost of a predetermined level of food and non-food items (Ravallion and Bidani, 1994).

poverty indicator of the household between the survey periods. Consequently, ΔP_i is a categorical variable and takes discrete values depending on the household's poverty indicator in the second survey. The change in poverty level of the household has three categories: persistently poor or better-off, moved-out of poverty and moved-in to poverty. This outcome variable does not show strict sequential ordering. So, multinomial regression model is applied for analysis. Hence, for convenience the dependent variable (ΔP_i) is coded with three values to represent the different poverty states. Let $\Delta P_i = -1$, if the household fall into poverty; $\Delta P_i = 0$, if the household remain same status; and $\Delta P_i = 1$, if the household moved-out of poverty.

Theoretically, factors that affect household consumption expenditure are expected to affect the household's poverty situation. This means all assumptions employed to develop the relationship between the external and internal factors of the household welfare are applied to model the change in the household's poverty level. What is different is nature of the dependent variables, i.e. consumption is a continuous variable while poverty status is discrete variable. Hence, the probability for the i^{th} household to be in the j^{th} state of poverty is given as:

$$\boldsymbol{P_{ij} = (\Delta P_i = j) = F_j(X_i,\ \beta)} \quad \text{where } \boldsymbol{j = -1, 0,} \text{ and } \boldsymbol{1} \qquad 6.5$$

where F_j is a functional form and should be formulated so that the probability being in the j^{ih} poverty state is between zero and one, X_i represents for poverty status invariant factors that affect the household's poverty status and β represents the parameter estimators. This indicates that F_j follows the functional form of multinomial model. Then the probability of the i^{th} household for being in j^{ih} state of poverty is given as:

$$P_{ij} = \frac{e^{X_i\beta_j}}{\sum_k^m e^{X_i\beta_l}}, \text{ where } j = -1, 0, 1 \text{ and } k \neq j \qquad 6.6$$

where $\sum_j^m P_{ij} = 1$ and since value of the regressors are the same across the different state of poverty multinomial logit model is used to estimate the parameters. The parameter estimates of the alternative poverty states are interpreted in reference to the base category $j = 0$, i.e. the poverty state where the household maintains the

previous level of poverty which means either remain poor or better-off. Model 6.6 is employed to examine the change in subjective poverty measure because associate of the objective poverty measures are captured model 6.4. Estimation results of this approach have an advantage to compare if the two measures tell different stories in identifying the factors that influence household vulnerability.

6.4 Data and Summary Statistics

6.4.1 Data and Definition

As indicated in chapter four, it is important to keep in mind that the possibility for the annual food expenditure to be overstated and the annual non-food consumption expenditure to be understated. Moreover, no corrections were applied when annual expenditures were generated to control for possible seasonal variations of the household's food consumption expenditure. However, these problems are less important for inter-temporal comparison of household welfare since both surveys were conducted in the same months.

Household consumption expenditure in per adult units is employed for the analysis to account for size, age and sex composition of the household. Consumption expenditure at poverty level for a hypothetical household is constructed using the price indices for Tigray Regional State available in MoFED (2012)[58]. In the MoFED (2012) report, three indices are produced for Mekelle town, other urban areas and rural areas. Accordingly, three different poverty levels are constructed for Mekelle town, other urban areas and rural areas (details of the adopted indices are provided in Annex6.1 and Annex 6.2). Then, depending on where the household is located (i.e. in Mekelle town, other urban or rural) objective poverty indicator is generated by comparing consumption expenditure of the household with the respective poverty level. The generated poverty index may not be a representative one due to nature of the data but is helpful in investigating farm household's poverty mobility.

[58] Poverty line for Tigray Regional State is computed from MoFED (2012) by adjusting the national poverty line using the price index indicated in the same document.

Subjective poverty is generated from the response of a question "How do you rank welfare status of your household compared to other households in the locality?" on four scale bases consisting of very poor, poor, medium and better-off. Then the response is collapsed into two groups of poor, represents poor and very poor households, and better-off, represents medium and better-off households. However, a household that perceives itself as poor in a better-off community (neighborhood) can be a better-off household compared to the household living in a deprived community and vice versa. A caution is important in using the subjective measure when making inter-community poverty comparisons. For this reason, town dummies are used in the analysis to minimize such kind of bias and to control spatial differences.

6.4.3 Summary Statistics

The head-count poverty level of both subjective and objective measures for the rur-urban and the rural farm households is reported in Table 6.1. Despite differences in the level of poverty, both subjective and objective measures indicate that the proportion of poor rural farm households has decreased between 2011 and 2012. This finding supports the MoFED's (2012) report on Ethiopia's poverty eradication progress. The level of food poverty is low compared to the national poverty level for both rur-urban and rural farm households. But this is not a surprising result because data were collected during the season where farm household's food consumption expenditure is expected to reach the highest level in the agricultural calendar.

Table 6.1: Subjective and objective poverty levels of the households by group

Head count Poverty	Rur-urban			Rural		
	2006	2011	2012	2006	2011	2012
Subjective poverty (%)	35.11	46.03	43.10	51.68	37.82	34.51
Objective poverty:						
Food poverty (%)		17.50	26.18		22.27	17.70
Absolute poverty (%)		62.92	71.67		69.33	57.08
Observation (N)	240	240	234	238	238	227

Note: data for the year 2006 were collected by retrospective questions during the first survey. Drop outs in the second survey and do not know responses are excluded from the computations.

Looking at the subjective poverty measure, in 2006 the proportion of the poor is higher in rural than rur-urban farm households while the opposite holds in 2012. Between 2006 and 2012, on average, the level of poverty has decreased and increased for rural and rur-urban farm households respectively. For instance, poverty has increased by about 8% in the rur-urban farm households and decreased by about 17% in the rural farm households. Similarly, the objective poverty measure also indicates that poverty has increased in rur-urban farm households and decreased in rural farm households between 2011 and 2012. In contrast to the rural households, both measures (subjective and objective) suggest that many rur-urban farm households seem to have difficulty in maintaining their level of consumption expenditure over time which is a concern in itself. This suggests that rur-urban farm households are becoming more susceptible to poverty than rural households.

The proportion of households who experienced shocks, between 2006 and 2010, is reported in Table 6.2. The percentage of rur-urban farm households that reported either one or more members of the household are jobless (about 20%) is twice that of the rural farm households (about 10%). Shocks such as joblessness, family health and inflation are significantly higher for the rur-urban households than the rural ones. In general, incidence of the different shocks is lower for the rural farm households compared to the rur-urban farm households. However, the incidence of covariate shocks (for instance inflation) seems the same for both cases.

Table 6.2: Incidence of shocks between 2006 and 2010

Type of shock reported	Rur-urban	Rural	Mean difference (rur-urban – rural)
Member of the household jobless (%)	19.1	10.1	0.04 (0.02)**
Separation, bankruptcy, shortage of food (%)	21.3	17.2	0.04 (0.04)
Member of the household sick or death (%)	22.1	13.0	0.14 (0.03)***
Property loss due to theft, fire, etc (%)	13.8	8.0	0.01 (0.03)
Occurrence of drought, flood, pest, etc. (%)	28.3	31.9	-0.03 (0.04)
Food price, other input price increase (%)	62.6	60.4	0.05 (0.04)*
Observation (N)	240	238	

The amount of land-compensation money given to farm households varies across towns (Table 6.3). On average, farm households in Adigrat received higher amount of land-compensation while househods in Alamata town recieved the smallest. But it is important to note that residential houses for most rur-urban farm households in Adigrat were demolished because of investments and they received additional compensation for their property loss as a result. If Adigrat town is excluded, on average, the amount of land compensation is higher in Mekelle, followed by Axum and the lowest is in Alamata town. This could be attributed to differences in land prices in the respective towns. The other reason might be the differences in implementation of land compensation policy in the respective towns because the analysis in chapter four shows that some households received plot of land and money while others received only money (see Table 4.9).

Female headed households, on average, received a lower amount of land compensation in contrast to male headed. This could be likely because landholding for male headed households is bigger than the female headed since mostly farmland was allotted on scale basis by considering head and spouse (each having equal weight) and for other family members the weight depends on their age.

The summary statistics of time-varying variables is presented in Table 6.4. Many heads of the rur-urban farm households (about 40% in 2012) still consider agriculture as their main job though the proportion has decreased slowly. On

average, the share of income from wage employment and farm activities is improved and have equal contibution between 2011 and 2012. In the case of the rural households, agriculture contributes half of their total income followed by income from nonfarm activities (i.e. about one third) and with constant shares over time. In contrast to the rural households, the rur-urban farm households' livestock holding and share of transfer income to total income have decreased over a year.

Table 6.3: Summary statistics of time-invariant variables by group

	Rur-urban		Rural	
Variables	Mean	Std. Dev.	Mean	Std. Dev.
Household head age	54.68	15.30	48.10	13.64
HH members above elementary	2.06	1.55	1.85	1.48
HH members elementary	0.77	0.96	0.96	0.96
HH members illiterate	0.53	0.58	0.61	0.70
Female adults in the household	1.55	1.02	1.63	0.98
Male adults in the household	1.39	1.11	1.52	1.07
Dependents in the household	2.06	1.58	2.52	1.63
Land holding in *tsimad* in	1.79	1.87	2.82	2.02
Female headed household (%)	33.00		27.27	
Household head married (%)	58.00		65.55	
Household head literate (%)	40.00		45.38	
Land compensation in ETB:				
For Male headed	46732.80			
For Female headed	36896.98			
In Mekelle	49094.18			
In Adigrat	54441.04			
In Axum	32282.46			
In Alamata	16966.40			
Observation (N)	240		238	

Note: HH stands for household and ETH represents Ethiopian Birr.

Table 6.4: Summary statistics of time-varying variables by group

	Rur-Urban				Rural			
	Year 2011		Year 2012		Year 2011		Year 2012	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Head main job farming (%)	46		37		70		62	
Real value of livestock (ETB)	6638.10	11497.23	6262.02	9622.30	6774.44	6999.72	8138.80	9343.90
Share to total HH income								
Farm income	0.28	0.36	0.33	0.35	0.51	0.31	0.50	0.32
Wage income	0.28	0.37	0.33	0.37				
Self-employment income	0.15	0.29	0.15	0.31				
Transfer income	0.21	0.32	0.17	0.30				
Nonfarm income					0.35	0.29	0.33	0.30
PSNP income	0.05	0.12	0.02	0.08	0.13	0.17	0.17	0.24
Observation (N)	240		234		238		227	

Note: HH stands for household, ETH represents Ethiopian Birr and PSNP is productive safety net program.

6.5 Estimation Results and Discussions

Section 6.3 of this chapter formulated two empirical models to estimate consumption growth (equation 6.4) and poverty mobility (equation 6.6) of the peri-urban farm households. Separate regressions and discussion are carried out for the rur-urban and the rural farm households for each model. Estimation outputs of these models are presented and discussed in the following sub-sections separately. All interpretation of the estimation results are done under *ceteris paribus* (keeping other factors constant) assumption.

6.5.1 Associates of Growth in Consumption

The dependent variable used in the regression is the logarithm of real household consumption expenditure per adult equivalent. The random effect (RE) and Hausman–Taylor's (HT) estimation methods are applied[59] to estimate the parameters and compare the outputs. Hausman-test is conducted and has insignificant p-value (i.e. equal to 0.24 for the rur-urban and 0.07 for the rural) which indicates that the RE model is consistent. Similarly, the Breusch and Pagan Lagrangian multiplier test for RE is strongly significant (i.e. p=0.001 for the rur-urban and p=0.02 for the rural) which indicates that RE model is better than OLS model. The Hausman–Taylor estimation method is likely to produce less efficient estimates in the presence of weak instrumental variables. However, the time-varying variables have sufficient within-panel variation thus they can serve as their own instruments (see the within variation of the regressors in Annex 6.3). The estimation outputs are reported in Table 6.5 and Table 6.6. Other than land compensation and income composition indexes, all variables included in the regressions for both the rur-urban and the rural farm households are the same. This is because land compensation is not an issue for the rural farmers and income indexes have four categories in the case of rur-urban households while three groups for the rural ones.

[59] In STATA *xthtaylor* command instead of *xtiverg* command is applied to correct the bias and estimate consistent parameters. This is because *xthtaylor* is an appropriate command where no instrumental variables are identified not included the model (Statacorp, 2011).

Rur-urban Farm Households welfare

Both models, HT and RE, produce similar results (Table 6.5) which is an indication of the results are robust to alternative models. Since there is no much difference in the parameter estimates, estimation results of the HT model are interpreted and the discussions based on HT estimates. Some human capitals of the household's strongly predict welfare of the household. Female headed households are found to achieve a lower level of welfare compared to male headed households. A household headed with a literate person enjoys a better level of consumption expenditure. Households with a large family size suffer welfare losses; the larger the number of dependents in the household, the lower the welfare (which is not surprising). However, a more worrying result is the negative effect of having a large number of adults (both female and male adults) in the household. This indicates that adults' earnings, on average, are lower and probably fail to cover the expected level of consumption which reflects the presence of underemployment or unemployment.

The share of transfer income (i.e. income from rent of an assets, pensions, productive safety net and remittance) is positively associated with household welfare. For instance if the household's share income from transfer income sources increase by 10%, welfare will be higher by 5%. This indicates that the higher the share of income from transfer sources the better the household's welfare. Both land compensation and livestock holding show strong positive effects on welfare, but the coefficients are extremely small which indicates having a negligible effect (i.e. a 100,000 ETB increase in land compensation or value of livestock results in less than 1% welfare improvement). This indicates that the amount of land compensation and livestock holding do not seem viable factors, in terms of policy or intervention, to have an effect on welfare of the household. Households in peri-urban Axum have better consumption expenditures compared to those in peri-urban Alamata. Incidences of health problems and food-shortage become significant impediments to the welfare of the household.

In general, the results suggest that the farm households who were successful in having higher consumption expenditure are likely to be those with literate heads, male headed, smaller family size, or having a high share of unearned income (i.e.

income earned form remittances and from renting-out of physical asset such as land, house, truck or cart etc)[60]. The positive relationship between unearned income and consumption expenditure is uncommon. This might be because a broad range of income sources are grouped under the same category. For instance, households who earn income from renting out a house, truck or cart are different from those who received remittances for a living. The results also suggest that households that are female headed, headed by an illiterate person or have large family size need special attention.

[60] Share income from self-employment is excluded from the estimation to avoid matrix singularity.

Table 6.5: Estimation of consumption growth for rur-urban households

	HT		RE	
Variables	Coefficient	Std. error	Coefficient	Std. error
a. Time variant exogenous Variables				
Head main job farming (yes)	0.058	0.054	0.045	0.045
Member of the household jobless	-0.017	0.052	-0.004	0.053
b. Time-variant endogenous variables				
Real value of livestock (in 1000 ETB)	3.19E-05	4.08E-06***	6.23E-06	2.04E-06***
Share of farm income	-0.116	0.111	0.002	0.080
share of wage income	-0.043	0.098	0.042	0.070
share of transfer income	0.519	0.125***	0.437	0.096***
c. Time invariant exogenous variables				
Head age	0.013	0.010	0.014	0.009
head age square	-1.50E-04	8.81E-05*	-1.63E-04	7.97E-05**
head sex (female)	-0.171	0.060***	-0.152	0.059***
head literate (yes)	0.085	0.052*	0.082	0.048*
Number of dependents	-0.190	0.040***	-0.093	0.017***
number of female adults	-0.101	0.023***	-0.061	0.021***
numbers of male adults	-0.148	0.024***	-0.107	0.020***
Size of farm land (in *tsimdi*)	0.004	0.016	-0.004	0.015
Land compensation (in 1000 ETB)	1.44E-06	5.55E-07***	1.51E-06	4.59E-07***
Location: reference Alamata				
Mekelle	0.099	0.080	0.141	0.078*
Adigrat	-0.053	0.094	-0.017	0.098
Axum	0.128	0.089	0.188	0.083**
Shocks				
Food shortage (yes)	-0.105	0.056*	-0.105	0.059
Health problems or death (yes)	-0.119	0.052*	-0.116	0.049
Loss due to theft or conflict (yes)	0.024	0.064	-0.007	0.057
Price increase (yes)	0.001	0.046	0.007	0.042
Constant	8.389	0.289	8.199	0.273
Sigma_u	0.215		0.210	
Sigma_e	0.308		0.315	
Rho	0.329		0.307	
Number of observations	448		468	
Number of groups	225		239	
Joint significance	wald χ (22) =132.24		wald χ (22) = 175.19	

Note: The dependent variable is change in log of real consumption expenditure per adult. Significance levels at 1%, 5% and 10% are represented by ***, **, and * respectively. Share of income from self-employment is omitted to avoid matrix singularity.

Rural Farm Households' Welfare

Similar to the estimation results for the rur-urban households, there is no significant difference in the estimation results of both HT and RE models (Table 6.6). This indicates that the estimated parameters are robust to the different models. Hence, estimation results of the HT model are interpreted and discussed. Factors related to human capital become the prime determinants of welfare of the rural households. Households with literate heads and small family size enjoy better levels of welfare. This may indicate that households with literate heads may be in a better position to take advantage of the different agricultural extension packages introduced in the rural economy. This is because access to market information and capacity building trainings could be easier for the household if the head can at least read and write. Like the rur-urban farm household, the higher the number of adults in the households the lower the level of welfare. The negative effect of having a large number of adult members might: i) be due to under reporting of consumption expenditures spent outside the purview of the respondent; or ii) imply that the prevalence of underemployment and/or unemployment in the region. This is not far from the truth since the region is known for small and degraded farmland holdings.

Controlling other factors, livestock ownership strongly influences the household's welfare. Households endowed with a high value of livestock enjoy better welfare, but the effect is small. If the household increases livestock holding by a value of 10,000ETB, welfare will be higher by about 0.2%. In other words, the household's welfare improves when livestock ownership increases by two or more oxen or the equivalent value of other livestock which is reasonable generally in the context of rural Ethiopia.

Nonfarm income clearly matters for the rural farm households' welfare. For instance, a 10% increase in share of nonfarm income is associated with 6% higher consumption expenditure. This means households with higher share of nonfarm income are in a better condition which supports the importance of diversified income sources in improving the rural household's welfare hypothesis (Barrett et al., 2000; Woldehanna and Oskam, 2001; Haggblade et al., 2007). The high level of nonfarm income is likely to be related with some household members who are

engaged in skilled wage employments or more household members are engaged in low-paying nonfarm activities.

It appears that rural households gain from inflation. Inflation (price increase for farm inputs and food items such cereals, pulses, etc.) shows a strong positive effect on rural household welfare. This suggests that producers are benefited from sale of their agricultural products and able to insulate themselves from the existing food price increases. The other significant variable is geographical location which is a proxy for size of the local economy by capturing the fixed effects of local market and agricultural resource endowments. Compared to farm households in Alamata, households in Mekelle are in a better position while those in Adigrat are vulnerable. This is not far from reality because, compared to Alamata, Mekelle is not only the regional capital but also the largest market centre in the region and farm households in Adigrat are endowed with relatively smaller and degraded farmlands. This indicates the importance of area-specific effects on the welfare of the rural households.

In summary, the results show that the head's literacy, size of the local market, share of nonfarm income and food price inflation play significant role in improving the welfare of the rural households in the peri-urban areas. But having large number of adults in the households lowers the welfare. The importance of nonfarm income and access to markets for welfare of the rural household concurs with the results of other studies in rural Africa (for instance see Dercon and Krishnan, 1996; Barrett et al., 2000).

Table 6.6: Estimation of consumption growth for rural households

	HT		RE	
Variables	Coefficient	Std. error	Coefficient	Std. error
a. *Time-variant exogenous*				
Head main job farming (yes)	0.022	0.054	0.005	0.049
b. *Time-variant endogenous*				
Real value of livestock in 000 ETB	1.73E-05	5.30E-06***	1.14E-05	2.69E-06***
Share of farm income	0.241	0.156	0.237	0.111**
share of nonfarm income	0.394	0.154***	0.256	0.116**
c. *Time-invariant exogenous*				
Head age	1.71E-03	9.99E-03	-6.55E-05	9.44E-03
head age square	-2.5E-05	9.31E-05	-2.0E-05	9.0E-05
head sex (female)	-0.008	0.058	-0.026	0.053
head literate (yes)	0.111	0.044***	0.111	0.043***
Number of dependents	-0.103	0.013***	-0.100	0.012***
number of female adults	-0.099	0.021***	-0.087	0.020***
numbers of male adults	-0.101	0.024***	-0.088	0.022***
Size of farm land (in *tsimdi*)	0.009	0.014	0.012	0.013
Location: refernce Alamata				
Mekelle	0.317	0.060***	0.318	0.067***
Adigrat	-0.146	0.079*	-0.133	0.082*
Axum	-0.072	0.076	-0.090	0.075
Shocks				
Food shortage (yes)	-0.080	0.056	-0.070	0.062
Health problems or death (yes)	-0.020	0.058	-0.033	0.061
Loss due to theft or conflict (yes)	0.048	0.072	0.064	0.068
Price increase (yes)	0.117	0.040***	0.104	0.038***
Drought, flood, heavy rain (yes)	0.012	0.043	-0.001	0.040
Constant	8.021	0.269	8.149	0.253
Sigma_u	0.154		0.148	
Sigma_e	0.307		0.311	
Rho (fraction of variance due to u_i)	0.201		0.184	
Number of observations	449		449	
Number of groups	226		226	
Joint significance	wald $\chi^2(20)$ =242.47		wald $\chi^2(20)$ = 281.77	

Note: The dependent variable is change in log of real consumption expenditure per adult. Significance levels at 1%, 5% and 10% are represented by ***, **, and * respectively. Share of income from productive safety net program (PNSP) is omitted to avoid matrix singularity

Comparing the rur-urban and the rural households, the head's level of literacy and number of adults in the household show same effect on welfare of the households. However, both groups are different in terms of the effects of factors related to sources of income, size of the local market, gender of the household head and occurrence of covariate shock such as inflation. Share of income from transfer sources become important for the rur-urban farm households while share of income from nonfarm activities is important for the rural farm household. Welfare of female headed households is lower than male headed households in rur-urban households but not in the case of rural households which means being female headed does not have an effect on welfare of the household. Similarly, the size of the local market matters for the rural households but for not the rur-urban households and food price inflation seem to improve welfare of the rural households.

6.5.2 Poverty Transitions and Determinants

The peri-urban farm households moved in and out of poverty between 2011 and 2012 (Table 6.7). Both poverty measures - subjective and objective - indicate that poverty level of the rural farm households is decreasing over time. Although at different levels, all measures show that the proportion of households staying poor is lower than those staying better-off. Moreover, the proportion of households moving-out of poverty is higher than those falling back.

Regarding the rur-urban farm households' poverty mobility, subjective and objective poverty measures show mixed results. The subjective poverty measure indicates that the percentage of farm households moving-out of poverty is higher than falling into poverty. However, the objective poverty measure indicates that the proportion of households becoming poor is higher than those becoming better-off. For instance, about 50 % of the poor in 2012 were better-off households in 2011 while about 14 % of the poor in 2011 became better-off households in 2012. This indicates that many households are becoming vulnerable and seem to be experiencing difficulty in maintaining their existing living conditions.

Generally, both measures of poverty- objective and subjective - shows similar results of poverty transitions of the households. The percentage of households

moving out of poverty is higher for rural farm households than rur-urban farm households. Moreover, the proportion of rural farm households moving out of poverty is higher than those falling back whereas the opposite holds for rur-urban farm households. This suggests that, in general, moving out of poverty seems easier for the rural farm households which concurs with the result of Bigsten and Shimeles (2008) and the likelihood to become poor is higher for rur-urban than rural farm household over time.

Table 6.7: Household poverty transitions between 2011 and 2012 by group

			2012			
			Rur-urban		Rural	
			Poor	Better-off	Poor	Better-off
2011	Subjective poverty (%):	Poor	66.98	33.02	57.32	42.68
		Better-off	22.58	77.42	21.53	78.47
	Food poverty (%):	Poor	56.41	43.59	38.00	62.00
		Better-off	20.21	79.90	11.93	88.07
	Absolute poverty (%):	Poor	86.3	13.70	67.52	32.48
		Better-off	47.13	52.87	33.33	66.67

Though results of the descriptive statistics represent the situations of poverty transitions, it is important to identify the correlates of household vulnerability to suggest policy elements for interventions. Hence, to identify the correlates of vulnerability separate regressions were run for the rur-urban and rural farm households. Results of the multinomial regression estimation for subjective poverty measures are reported for the rur-urban and rural households in Table 6.8 and Table 6.9 respectively. Robust standard errors are reported to control cluster sampling probabilities and to correct hetroskedasticity and multicollinarity[61].

[61]Hetroskedasticity refer to when observations have different variance and it causes incorrect inference. Multicollinarity is a term used to indicate the problem when near exact linear relationships among the explanatory variables lead to unreliable regression.

Rur-urban Households

Education of the head, livestock ownership and land compensation play significant roles in the farm household's vulnerability (Table 6.8). The likelihood to move-out of poverty is higher when the head has above four years of education while the possibility to fall back to poverty is higher when the head has lower elementary education. This partly reflects the importance of education to adjust to the changing employment opportunities in the peri-urban areas. The effect of large female adult members in the household's is ambiguous in the poverty mobility of the household.

Both land compensation and value of livestock seem significant for the household to move out and fall back to poverty. But the effect of the respective factors is small and direction of the effect is inconclusive. This is because both factors significantly contribute to the household to move in and out of poverty but the size of their effect is practically zero. Female headed households are likely to fall back to poverty and are more vulnerable compared to male headed counterparts. The larger number of dependents in the households, the likelihood for the households to fall back to poverty is lower. Compared to rur-urban farm households in Alamata, the likelihood to fall back to poverty is less for households in Adigrat and the likelihoods to move-out of poverty is higher for households in Mekelle. This indicates that the importance of the local economy where the probability to move-out of poverty is higher when size of the local market is larger. Similarly, inflation decreases the household's likelihood to move-out of poverty. Occurrence of shocks related to conflict lowers the probability for the household to fall back to poverty.

Generally, gender and education level of the household head and size of the local economy play a significant role for the household's likelihood to move-out of poverty. These factors have also similar effects on consumption growth of the household (see Table 6.5).

Table 6.8: Multinomial logit estimation results for rur-urban households

	Move-in to poverty		Move-out of poverty	
	Ceof.	Std	Ceof.	Std
Head age	-0.484	0.183	-0.060	0.155
Head age square	0.004	0.002	0.001	0.001
Female headed (yes)	1.584*	0.932	-0.207	0.746
Head's main job farming (yes)	0.660	1.148	0.581	0.969
Head education elementary (yes)	2.344**	1.059	1.452	0.915
Head education above elementary (yes)	0.153	1.231	2.284**	1.139
No. dependents	-0.968***	0.343	-0.214	0.252
No. female adult members	0.758**	0.333	0.551*	0.298
No. male adult members	0.614	0.425	0.381	0.309
size of farm land (in *tsimdi*)	-0.078	0.223	-0.185	0.224
Livestock in constant prices in 000 ETB	0.314***	0.014	0.173*	0.093
land compensation (in 1000 ETB)	0.048***	0.014	0.0217*	0.0123
Town dummy: (Alamata base category)				
Mekelle	0.190	1.056	2.591**	1.195
Adigrat	-3.438**	1.587	0.586	1.359
Axum	-0.108	1.238	0.723	1.283
Income sources:				
share of farm income	1.365	2.041	1.701	1.603
share of wage income	0.317	1.517	1.158	1.220
Share of transfer income	2.079	1.640	1.317	1.537
Shocks dummy:				
Health problems or death (yes)	0.463	0.916	0.514	0.754
Property loss due to theft or conflict (yes)	-3.858**	1.559	-0.564	1.028
Food or farm input price increase (yes)	1.314	0.924	-1.311**	0.657
Constant	6.607	4.696	-3.735	4.545
No. of observations		134		
Log-likelihood		-81.183		
Pseudo R^2		0.4027		

Note: Base category is the household maintains the same level of status, i.e. either remains poor or better-off. Significance levels at 1%, 5% and 10% are represented by ***, **, * respectively. Share of income from self-employment from urban and share of transfer income from rural data are omitted to avoid matrix singularity.

Rural farm Households

Ownership of farmland becomes important for the rural farm household to move out of poverty (Table 6.9). Similarly, the higher share of farm income the more the household feels better-off. This possibly indicates that farm households are benefiting from the market opportunities of their agricultural output or less likely affected by food price inflation. But those households with large livestock holdings are at risk of falling back to poverty. The likelihood to fall-back into poverty is higher for households with large livestock ownership. The results suggest that farm households endowed with bigger farmlands, not with bigger livestock holdings, are less likely to be vulnerable which might be associated with the incidence of climate shock and the differential effect on the assets. One possible reason could be the duration of recovering the livestock lost by drought may last long while this might not be the case for the crop income.

Share of nonfarm income becomes a weak indicator of vulnerability because it is significant at 10%. The higher share of income from nonfarm sources the higher the possibility for the household to fall back in to poverty. This reflects that either the household is facing difficulties to cover the living expenses due to inflation or feel insecure due to the nature of nonfarm activities engaged in. For instance, households engaged in seasonal and less-skilled employment schemes are more likely suffer job insecurity. Moreover, the possibility of falling back in to poverty is high if the main job of the household head is farming compared to heads that consider nonfarm activities as the main job. These outcomes signal that classifying jobs as farm and nonfarm are ambiguous because the nonfarm sector is quite heterogeneous and consists of skilled and unskilled employment opportunities with differential returns. The skilled and unskilled nonfarm employment classification is further investigated in chapter seven of this thesis.

In summary, ownership of bigger farmland plays a decisive role for the rural households to move out of poverty. But it is also observed that the possibility for the household is higher if the head of the household considers farming as the main job. Unlike the estimation results of the consumption growth model, variables related to the household's family size and the local economy are not significant predictors of poverty mobility. The share of nonfarm income shows opposite effects on the

household's consumption growth and vulnerability. Share of nonfarm is positively associated with consumption growth while it seems negatively associated with the subjective measure of poverty.

Table 6.9: Multinomial logit estimation results for rural households

	Move into poverty		Move out of poverty	
	Ceof.	Std	Ceof.	Std
Head age	0.306	0.223	-0.125	0.178
Head age square	-0.0038*	0.0022	0.000	0.002
Female headed (yes)	0.752	1.022	-0.796	0.877
Head's main job farming (yes)	1.663*	0.880	0.192	0.872
Head literate (yes)	1.317	0.901	-0.911	0.826
No. dependents	-0.158	0.261	0.361	0.246
No. female adult members	-0.478	0.429	0.165	0.389
No. male adult members	0.102	0.490	0.596	0.438
size of farm land (in *tsimdi*)	0.298	0.282	0.555**	0.271
Livestock in constant prices (in 1000 ETB)	0.556***	0.191	0.093	0.159
Town dummy: (Alamata base category)				
Mekelle	-0.874	1.013	-1.462	1.024
Adigrat	-1.752	1.432	0.311	1.227
Axum	-0.707	1.490	-0.667	1.428
Income sources:				
share of farm income	0.997	1.902	4.222**	1.958
share of nonfarm income	3.501*	1.924	2.688	1.975
Shocks dummy:				
Health problems or death (yes)	1.083	1.028	0.994	1.135
Food or farm input price increase (yes)	0.326	0.739	-0.113	0.687
constant	-9.885	5.862	0.654	4.767
No. of observations	111			
Log-likelihood	-78.145			
Pseudo R^2	0.3481			

Note: Base category is the household maintains the same level of status, i.e. either remains poor or better-off. Significance levels at 1%, 5% and 10% are represented by ***, **, * respectively. Share of income from self-employment from urban and share of transfer income from rural data are omitted to avoid matrix singularity.

6.6 Conclusion

This chapter identified the different factors that influence welfare and vulnerability of peri-urban farm households by contrasting the rur-urban and the rural households and with different contexts in terms of administration. By doing this, it is possible to identify whether factors associated to consumption expenditure and vulnerability of the peri-urban farm households are the same regardless of policy priority orientations of the administrations they belong to, i.e. the rural and the urban development. Moreover, it helps to understand whether the factors associated with the subjective and objective poverty measures of the farm household are different.

Rur-urban farm households

Consumption growth of the household is positively related to the level of education of the head of the household and the share of income from unearned income sources but negatively related to family size, experiences of shocks related to health and food shortages and if the household is female headed. On the other hand, the possibility to move out of poverty (i.e. using subjective poverty measure) is higher if the head has an education exceeding four years of schooling and lower if the head is female. The effects of land compensation and livestock holding are ambiguous because these factors are positively related with moving out of or falling back into poverty. Therefore, both measures - subjective and objective - indicate that education and sex of the household head are vital factors for the household's welfare and vulnerability.

Rural households

Objective poverty (i.e. consumption growth) is positively associated with livestock holding, education level of the head, share of nonfarm income and size of the local market while negatively related to family size. However, the subjective poverty measure indicates that farmland and size of farm income are likely to help the household to move out of poverty. The probability to fall back into poverty is positively related with livestock holding, share of nonfarm income and if the head

considers farming as the main job. Therefore, both measures are telling different stories about the factors that affect welfare of the rural households.

Comparing both groups, gender and education status of the household head are important factors for welfare of the rur-urban households while these factors are less important for the rural households. Hence, it is vital that policy makers consider these factors in designing development packages and land compensation schemes. Regarding rural households, a household with diversified nonfarm income sources seems in a better-off situation than the ones mainly focused on farming. This indicates the importance of the nonfarm activities in the lives of rural farm households. This in turn asserts the importance of the sectors in rural development (Haggblade et al., 2007). The evidence also suggests that the factors associated with the farm household's welfare are different depending on the administration they belong to. Similarly, the nonfarm income appears to be important. But studies indicate that the nonfarm sector is heterogeneous which merits further investigation. This issue is addressed in chapter seven.

Annex 6.1: Poverty line and price index

a) Country level

Price index 100= December, 2010

Food poverty line per adult equivalent =1985 (Birr)

Total poverty line per adult equivalent = 3789 (Birr)

b) Tigray Regional State

	Food index	Non-food index	Total index
Regional	1.047	1.021	1.034
Mekelle	1.10	1.55	
Other urban	1.08	0.98	
Rural	1.08	0.98	

Source: extracted from the Ministry of Finance and Economic Development, Ethiopia annual progress report (MoFED, 2012).

Annex 6.2: Tigray Regional State Poverty line, at December 2010 prices

	Regional	Mekelle	Other Urban	Rural
Food poverty line per adult per year (ETB)	2078.30	2184.30	2143.81	2044.56
Total poverty line per adult per year (ETB)	3917.83	5032.45	3901.85	3807.82

Source: computed using data from MoFED (2012).

Annex 6.3: summary statistic of time-varying variables

a) Rur-urban farm household data

```
. xtsum hjob trlval job sfarm swage ssemp stfer
```

Variable		Mean	Std. Dev.	Min	Max	Observations
hjob	overall	.4147368	.493196	0	1	N = 475
	between		.4458031	0	1	n = 240
	within		.2129757	-.0852632	.9147368	T = 1.97917
trlval	overall	6.452438	10.6036	0	93.16039	N = 474
	between		9.979145	0	81.46533	n = 240
	within		3.538509	-15.48274	28.38761	T = 1.975
job	overall	.1389474	.3462563	0	1	N = 475
	between		.2593358	0	1	n = 240
	within		.2319428	-.3610526	.6389474	T = 1.97917
sfarm	overall	.3022504	.3529866	-.13	1	N = 475
	between		.3175951	0	1	n = 240
	within		.1566813	-.1977496	.8022504	T = 1.97917
swage	overall	.3015964	.371192	0	1	N = 475
	between		.3199828	0	.9930128	n = 240
	within		.1883614	-.1984036	.8015964	T = 1.97917
ssemp	overall	.1537747	.297064	0	1.01	N = 475
	between		.2518081	0	.9570659	n = 240
	within		.1566891	-.3512253	.6587747	T = 1.97917
stfer	overall	.1917053	.315252	0	1	N = 475
	between		.284128	0	1	n = 240
	within		.147058	-.3082947	.6917053	T = 1.97917

b) Rural farm household data

```
. xtsum hjob rlval sfarm strn snf
```

Variable		Mean	Std. Dev.	Min	Max	Observations
hjob	overall	.6616379	.4736631	0	1	N = 464
	between		.4267051	0	1	n = 238
	within		.2154908	.1616379	1.161638	T = 1.94958
rlval	overall	7440.481	8247.261	0	70418.92	N = 465
	between		7759.097	0	56059.09	n = 238
	within		2691.069	-10929.35	25810.32	T = 1.95378
sfarm	overall	.5069978	.3166249	0	1	N = 463
	between		.2835932	0	1	n = 238
	within		.1491698	.0069978	1.006998	T-bar = 1.94538
strn	overall	.1533045	.2058056	0	1	N = 463
	between		.1874532	0	1	n = 238
	within		.1063849	-.3466955	.6533045	T-bar = 1.94538
snf	overall	.3400216	.2980844	0	1	N = 463
	between		.2621533	0	.975	n = 238
	within		.1461501	-.1599784	.8400216	T-bar = 1.94538

Note: *hjob* refers to main job of the household head, *trlval* is value of livestock owned in 1000's, *job* stands for joblessness of any adult in the household, *sfarm* share of farm income, *swage* share of wage income, *ssemp* share of self-employment income, *stfer* share income from remittance or asset rent-out, *strn* share of income from productive safety net programs and *snf* share of nonfarm income.

Chapter 7: Income Sources and Diversification Strategies of Peri-urban Farm Households

7.1 Introduction

Many developing countries re-classify boundaries of the urban areas to fulfill the increasing demands of urban land use (Webster, 2002; Simon et al., 2004). This procedure limits availability of arable land for the farming communities in peri-urban areas. As a result, farmers in urban peripheries are progressively being integrated into urban livelihood systems. In other words, livelihood diversification in urban peripheries becomes less dependent on natural resources and being shift to urban employment and urban services over time. The concern here is not to preserve natural resource-based livelihoods rather to identify factors that contribute to smooth rural-urban livelihood transitions, so that lessons can be drawn to devise livelihood strategies for the poor and vulnerable farm households that can foster their productive capacity.

In the transition from a natural-resource based to a cash-based means of living, peri-urban farm households pursue different livelihood strategies to reorient their income sources, to accumulate assets and to survive in the cash economy. Livelihood strategy requires maintenance and continuous adjustment of activities to secure a means of living in the urban labour market. The outcome of rural to urban livelihood transition can be positive or negative where the latter is a concern. Negative livelihood adaptation likely occurs, when the household shifts from relatively rewarding activity (e.g. producing cash crops) to less rewarding nonfarm activities or low paying waged employments.

Existing studies on livelihood adaptation and diversification generally focus on rural households (e.g. Davies and Hossain, 1997; Scoones, 1998; Ellis, 2000; Lanjouw, 2001; Ellis, 2005; Reardon et al., 2007a). However, peri-urban areas are different from rural areas because peri-urban areas are known for the coexistence of dynamic rural and urban living styles where the rural system fades with passage of time (Simon, 2008) and have no uniform definitions (Cohen, 2004). Given these peculiar

features of peri-urban areas, the common assumptions of rural livelihood diversification strategies could be less effective if applied in the peri-urban context. The purpose of this chapter is, therefore, to investigate income diversification strategies of peri-urban farm households' and the factors that contribute to the smooth rural-urban livelihood transitions using panel dataset from Tigray, Northern Ethiopia.

Unlike the rural households, peri-urban farm households' diversification to nonfarm sector is imperative to make a living. However, access to the lucrative nonfarm activities is limited due to entry barriers (Barrett et al., 2000; Abdulai and CroleRees, 2001; Woldehanna and Oskam, 2001) and missing markets for labour and land (Barrett et al., 2001b). This suggests that not only asset-poor farm households are likely to be marginalized in the shift from farm to nonfarm activities but also households who were benefiting from diversified agricultural activities due to asset fixity (e.g., owning irrigation canals, hand-dug wells, specific agricultural tools and skills). However, very little is known about the patterns of income diversification strategies of peri-urban farm households.

Peri-urban farm households might decide to pursue particular income generating activities, in the presence of missing markets for credit and land, in order to survive and maximize the returns from the activities. However, these households have differential access to available income generating activities and returns from the activities may not be all rewarding. Hence, identifying choices and constraints that the households face in making their decision to be engaged in specific income generating activities can offer important policy implications that can help to improve the productive capacity of the poor. Examining income diversification strategies of peri-urban farmers in developing countries such as Ethiopia provides an important input in designing targeted intervention to secure viable livelihoods for the poor. So, this chapter aims to contribute to the future design of effective interventions for peri-urban poor in order to improve their access to assets and to improve the productivity of the assets they already own.

The chapter proceeds as follows. The next section presents the framework of income diversification strategies of farm households in the peri-urban context. Section 7.3 describes the data and provides specific definitions of terms used for the analysis.

Section 7.4 presents the summary statistics of income diversification strategies employed by households in the different income groups. Estimation results, of the factors that affect the household's decision to pursue a specific income diversification strategy, are discussed in section 7.5. Conclusion and policy implications are presented in section 7.6.

7.2 Conceptual Framework: Causes to Diversify Income Sources

As discussed already, urban expansion limits peri-urban farmers' access to farmland and natural resource-based livelihood which causes a forced displacement of income sources of the farm households. This suggests shrinking of farming activities and expansion of the nonfarm sector in the urban peripheries. Hence, peri-urban farm households' income diversification to the nonfarm sector is a natural response in adjusting to and surviving urban livelihoods. Literature groups the driving forces of rural income diversification into "*choice pull factors"* to accumulate wealth and "*necessity push factors*" in order to survive (Ellis, 2000; Barrett et al., 2001b)[62]. From this perspective, it can be argued that peri-urban farm households' diversification to alternative income activities is more likely for *necessity* than for *choice* reasons. This is because most peri-urban farm households, with limited access to farmland, are forced to diversify to the nonfarm sector to sustain their lost income due to urban expansion.

Diversification is the norm for many smallholder farmers in developing countries (Barrett et al., 2001b; Davis et al., 2010) and rural nonfarm activities are concentrated in urban peripheries (Lanjouw et al., 2001). This suggests that peri-urban farm households have a locational advantage to diversify in to the nonfarm sector compared to farmers in the rural hinterland. However, the constraints and incentives to diversify to the nonfarm sector are likely to be different from household to household depending on their experiences, skills and asset ownership.

[62] Discussions of the push and pull factors are given in many household studies that examine diversification (e.g., Ellis, 1998, 2000; Barrett et al., 2000).

Following Bezu and Barrett (2012), the nonfarm sector can be broadly classified in to high-return activities (e.g. skilled waged employment, trade, etc.) and low-return activities (e.g. unskilled wage employment, street vending, etc.). High-return nonfarm activities, generally, require skills and initial investments while low-return nonfarm activities are free of these constraints. In the presence of missing markets for credit and insurance, which is a general truth for developing economies, a hypothetical farm household has to either possess or wait to accumulate the necessary capital (such as skills, tools and finance) in order to enter into high-niche nonfarm activities. Hence, peri-urban farm households endowed with non-agricultural skills and experience may have better opportunities to be engaged in rewarding nonfarm activities while those possessing agricultural skills, tools and equipments are likely to diversify into low-return nonfarm activities.

Entry barriers to high-return nonfarm activities can cause differential livelihood outcomes in the transition from rural to urban livelihoods. Farm households equipped with nonfarm skills and experience may easily access rewarding nonfarm activities; have better opportunities to compete in the urban labour market; and can easily adjust to urban livelihoods. But others diversify to low-return activities because they have little choice and find it difficult to adjust to the cash economy. When households exercise desperate diversification strategies to survive, they are likely to engage in low-return activities to support their living. In other words, in the absence of interventions that aim to improve productivity of the household's agricultural capital, possession of nonfarm capital may play a key role in a smooth rural-urban livelihood transitions. Using the panel data collected, this chapter examines the income diversification strategies of the peri-urban farm households and the factors that influence the household's decision to choose one strategy over the other.

7.3 Data and Definition of Terms

7.3.1 Data

Details of income sources of the household and contributions from each source are presented under this topic. Data on household income earned in 2011 and 2012 were

collected by sources and type of employment activity during the survey. Income earned by any adult member of the household (e.g. waged) or the household as a whole (e.g. farm income, transfer income) is considered as income of the household.

Collecting data on income of farm households is generally difficult because it is highly susceptible to measurement errors (e.g. see Dercon and Krishnan, 1998). Although a considerable effort has been made during the survey to collect correct data, this does not mean that the data is free of errors. However, this problem is not a serious concern for this study because the main focus of the analysis is on income sources and factors that affect the household's livelihood strategy. Income data is employed only to group the farm households into income quartiles and examine the relationship between income sources and income quartiles. The income quartiles are computed on per adult equivalent basis to account for the age and sex composition of the household and total household income is not inflation adjusted.

7.3.2 Definition of Terms

For simplicity, sources of income are broadly classified in to farm, nonfarm and unearned income. A household is said to be involved in farm or nonfarm activity, if at least one member of the household is engaged in the activity. Farm income consists of on-farm and off-farm income. On-farm income includes income earned from the household's own farm. Off-farm income consists of income earned by the household from waged employment on other household's farm or collecting natural resources such as sand, stone, wild fruit, etc.

Nonfarm income consists of income earned from labour employment. Employment in the nonfarm sector is further classified in to skilled and unskilled employment based on the returns. This classification is more convenient to examine whether the households are engaged in the nonfarm sector to accumulate capital or for mere survival. Skilled nonfarm employment (i.e. waged or self) refers to an employment opportunity that requires possessing a non-agricultural skill or an initial investment to be engaged in the activity and a relatively rewarding activity (e.g. commerce, plumber, masonry, carpenter, civil servant, etc). Unskilled employment refers to employment (i.e. waged or self) in low-return activities (e.g. domestic work, daily labourer, street vendor, embroidery, blacksmith, etc). A household is considered as

engaged in skilled nonfarm employment, if at least one member of the household has earned income from skilled employment.

7.4 Income Sources and Diversification Strategies

7.4.1 Income Sources and Distribution Patterns

Summary of income sources distribution across income quartiles is presented in Table 7.1. Quartile 1 (Q1) represents the poorest cohort and quartile 4 (Q4) stands for the richest. Household income, on average, has improved between 2011 and 2012 for all cohorts. Agriculture remains an important source of income to all income groups of both rur-urban and rural households. About 60% of the rur-urban farm households are still engaged in agriculture even if the size of farmland is reduced because of urban expansion.

Rur-urban farm households, on average, obtain about 25% of their total income from crop and livestock production while rural households earn about 50% of their income from the same source. Households in the lowest cohort mainly depend on agriculture and transfer income sources far more than the upper cohort. However, the total agricultural income of the lowest three income groups of rur-urban farm households is less than that of the upper group. This suggests that not only agriculture is important but also that the sector is dominated by households in the upper quartile. This in turn indicates that the poor face constraints (e.g. access to land rent, labour or finance) to enter into urban market-oriented agricultural activities such as production of vegetables and dairy.

Households in the upper quartile are pluralist and derive the major share of their income from agriculture and skilled nonfarm employment opportunities (e.g. in the construction sector and self-employment in the service sector). Income shares from skilled and unskilled nonfarm activities, in general, show inverse patterns across income quartiles. The share of income from skilled nonfarm activities increases as income per adult income rises. The contribution of this sector ranges from about 3% in the lowest cohort to about 50% in the upper income cohort in the case of rur-urban farm households while it is about 5% to 32% in rural households. This clearly signals that the better-off households dominate the lucrative nonfarm activities. The

results are consistent with other studies (e.g see Woldehanna and Oskam, 2001; Bezu and Barrett, 2012) that emphasize the existence of entry barriers to lucrative nonfarm employment options.

Comparing the groups in the lowest income cohort, rur-urban farm households seem to have limited access even to unskilled nonfarm employment options compared to rural households. Given the fact that unskilled nonfarm activities are labourious, this indicates that rur-urban farm households in the lowest quartile are either labour poor (e.g. physically not fit due to age or health factors) or have a higher reservation wage to participate in low-paying nonfarm activities compared to rural households. Following agricultural income, unearned income sources (i.e. income from land and house rent, remittance, gifts, pension, etc.) seem to be the major contributors to rur-urban farm households in the lower income quartiles.

The proportion of households that earn income from productive safety net programmes is higher in the rural households than rur-urban farm households. This is because participation in soil and water conservation works is mandatory for the rural households with and without payment depending on wealth status of the households. Some rur-urban farm households may still own farmland either fully or partially and have an obligation to participate in conservation works and get paid depending on their wealth status.

Table 7.1: Per adult equivalent income distribution by income quartile

	2011						2012					
	Q1	Q2	Q3	Q4	Average	Use	Q1	Q2	Q3	Q4	Average	Use
Rur-urban farm households												
Farm income												
On-farm (crop and livestock)	43	31	17	24	27	61	48	31	28	23	25	76
Nonfarm												
Skilled employment	1	21	49	50	44	40	5	25	25	45	39	35
Unskilled employment	5	17	18	9	12	18	12	29	31	18	18	32
Productive safety net	13	5	2	1	2	41	5	2	1	1	1	37
Rent, remittance, etc.	38	22	13	15	12	56	28	14	14	12	16	46
Mean income (ETB)	**604**	**1774**	**3311**	**8251**			**1077**	**2673**	**4501**	**10862**		
Observation (N)	60	60	60	60	240		59	58	59	58	234	
Rural households												
Farm income												
On-farm (crop and livestock)	40	42	55	60	49	92	42	54	49	52	49	91
Off-farm	2	2	3	3	2	14	3	2	2	0	1	7
Nonfarm												
Skilled employment	3	16	26	29	18	41	7	9	31	35	20	38
Unskilled employment	19	21	8	3	12	34	14	20	10	7	13	30
Productive safety net	21	13	8	3	11	73	14	11	7	4	9	63
Rent, remittance, etc.	15	5	1	2	6	35	19	3	2	2	7	26
Mean income (ETB)	**1431**	**2622**	**3821**	**10358**			**1537**	**3023**	**4479**	**9255**		
Observation (N)	60	59	59	60	238		57	56	57	56	226	

Note: Q1 is the first quartile, the group with the lowest income and Q4 is the highest income group. Use indicates the percentage of households earned income from the sources or participated in the activity. Missing observations are excluded. The numbers in the parenthesis are observations in each quartile. All figures are in percentages, except the mean income except observations.

In Ethiopia the construction industry is expanding. Hence, peri-urban farm households have a locational advantage to be engaged in the industry either in skilled employment (i.e. as carpenter, masonry, plastering, etc.) or unskilled employment (e.g. as daily labourer in construction, domestic worker). Unskilled employment in the construction industry can be common among the young until they acquire the skill to enable them to advance to skilled employment options. Out of the total nonfarm employment, on average, about 40% of rur-urban households and about 52% of rural households participated in the industry (Table 7.2).

The proportion of households engaged in the nonfarm employments is higher for the rural households than the rur-urban ones but unexpected and contrary to the current perception in the literature. There are potential factors that likely contribute to this scenario. Presumably the lower availability of labor in the household leads to no participation in the construction industry. This is because the rur-urban households can potentially fit in to labour demanding activities, given their skills. But, compared to the rural households, many rur-urban households are likely labour-poor because the household head age and the number of female headed households are slightly higher compared to the rural ones (see Table 6.5).

The other reason could be the nature of transfer income category which consist a wide range of income sources earned from rents of assets other than remittance. Hence, some rur-urban households are likely grouped in the transfer income group which ultimately reduced their proportion in the nonfarm employment as a result. It is also important to keep in mind that: i) both groups have similar access to the activities in terms of distance because they are within 15kms from the edge of the town; and ii) households grouped as rural are subsistence farmers and it is well documented in the literature that diversification is the norm particularly in peri-urban areas which is the same in this study too.

Table 7.2: Percentage distribution of nonfarm employment

	Rur-urban		Rural	
	2011	2012	2011	2012
Engaged in nonfarm employment	57.92	67.23	75.18	71.37
In construction	38.85	43.04	56.98	48.76
Outside construction	61.15	56.96	43.02	51.24
Observation (N)	240	234	238	227

Note: If at least one member of the household is engaged in nonfarm activity, then the household is considered as participating in nonfarm employment.

In summary, agriculture remains the major source of living to farm households in the lower income cohorts. Agriculture contributes about 40% of the total income of the poorest households followed by transfer income which is about 30%. On average, skilled nonfarm activities (about 47%) followed by agriculture (about 24%) are the top two contributors to income of rur-urban farm households in the upper income cohort. Similarly, for the better-off rural households the major contributors of their income are agriculture (about 55%) and skilled nonfarm employment (about 30%). This is not beyond expectation because rur-urban farm households have lost their farmland, partially or fully, and may capitalize on nonfarm employment while rural households still own their farmland and farming is expected to be the main job. Following farm income, unearned income sources and low-return nonfarm employment are the major contributors to income of the poor rur-urban farm households and the rural households respectively. These results show the relative importance of income sources for each income group. It is also likely that the farm household in each income quartile earns income from different income sources where one source is dominant over the other. This necessitates investigating the dominant income diversification strategies employed in each income quartile.

7.4.2 Income Diversification Strategies

Income diversification is the norm for farmers nearer to the outskirts of urban centers in the semi-arid agro-ecologies of rural Africa (Barrett et al., 2005) and for

smallholder rural farmers in developing economies (Davis et al., 2010). Hence, sole reliance on farming is a rare case in drought prone environments and in the presence of incomplete or absent land markets. Additionally, in areas where landholding is very small and fragmented, the household may not have sufficient farmland to absorb all of the working labour force. The data in Tables 7.4 shows that all income groups derive income from different sources. For instance, in addition to agriculture, most households in the lower cohorts depend more on unskilled waged employment and social transfer programs while the better-off households depend more on skilled (i.e. waged or self) employments in the nonfarm sector. Generally, the results signal that most households use mixed income diversification strategies to support their lives.

Based on the household's engagement in productive employment options and unearned income source, five major income diversification strategies are identified from the data. But it should be noted that the income diversification strategies do not necessarily exclude transfer income sources. This is because households could draw income from unearned income sources while participating in farm and nonfarm activities. The other reason is that if a farm household owns farmland, it is mandatory for the household to participate in soil and water conservation activities with or without payment depending on the wealth status of the household.

The first diversification strategy is combining farming with skilled nonfarm (i.e. waged or self) employment. This strategy requires access to inputs for farming activities (e.g. crops, vegetables, fruits and/or dairy products) and skills or initial investments for rewarding nonfarm activities (e.g. construction, service and trade). The rationale for combining both activities is that income earned from cash-crops (e.g. vegetables and dairy products) could be invested in high-return nonfarm activities or income from lucrative nonfarm employment could be used to improve agricultural productivity.

The second strategy is for farm households that are reliant on farming and unskilled employment (e.g. domestic work, daily labourer, street vendor, embroidery, etc). This strategy is most likely preferred when households somehow have access to land and labour but lack the required skills or inputs to enter into high-paying nonfarm activities. The third strategy is when households depend on farming and transfer

income sources but not on any nonfarm employments. Households endowed with limited labour and skills are expected to utilize this strategy.

The fourth and fifth strategies focus on households that are not engaged in farming activities likely because of limited access to farming inputs. This is because there are landless households due to the fact that they are either fully dispossessed-of their farmland due to urban expansion or do not own farmland at all. These households possibly depend on non-agricultural activities, transfer income sources, or both. Households endowed with skill or labour might be engaged in nonfarm activities while others who lack the required skill or labour likely utilize transfer income sources to support their life. Consequently, the fourth and fifth diversification strategies are for households that derive their income from nonfarm activities and only from transfer incomes sources, respectively.

Distribution of the distinct income diversification strategies employed across income quartile over time is reported in Table 7.3. The proportion of households that entirely depend on a single strategy, on average, is decreasing as income quartile increases. Most rur-urban farm households in the upper income cohorts opt for farm with nonfarm strategy while those in the lower income quartiles combine farm with transfer income sources. Diversification strategies of the rural households' are quite similar to those of rur-urban farm households, except most households in the lower quartile practice mixed - farm with nonfarm - strategies. The proportion of households that employ a strategy that combines farm and skilled nonfarm activities increases with income while utilizing farming with unskilled nonfarm employment decreases with income. This pattern partly reflects the positive correlation between farm and nonfarm income and captures the differential access to skilled labour.

Combining farming with transfer income sources (i.e. remittances, rents, pensions, etc.) is the dominant strategy for the poorest quartiles of rur-urban farm households, whereas most of the lower quartiles of rural households mainly mix farming with unskilled nonfarm employment strategy. This indicates that rur-urban farm households are either labour poor or have a higher reservation wage compared to their rural counterparts. Although about 25% of rur-urban farm households pursue only one strategy to support their living, depending entirely on a single income strategy does not seem a viable option for the rural households, i.e. less than 10% of

the households depend on either nonfarm or transfer income sources. These results concur with diversification rather than specialization is the norm in rural Africa hypothesis by Davis et al. (2010) and Barrett et al. (2005).

The proportion of rur-urban farm households that utilize a single strategy decreased between 2011 and 2012 where most of the households possibly shift to a mixed strategy, i.e. farming with unskilled nonfarm activities. Perhaps some households that pursue only nonfarm employment invest their savings in the farm sector which signals the attachment and importance of farming in the lives of the rur-urban farm households. Even if availability of farmland is limited in the peri-urban areas, compared to 2011, the percentage of rur-urban farm households engaged in the farming sector increased by 14% in 2012. This means that more households are being attached to the farm sector which is an interesting case by itself.

Generally, most peri-urban farm households - about 70% of the rur-urban farm households and 90% of the rural households - employed mixed strategies by combining farming with other income (employment) sources in 2012. Households in the upper income cohort mostly pursue farm and skilled nonfarm employment jointly. Rur-urban farm households in the lower income quartile mostly combine farming activities with transfer income sources. However, for most of the poorest rural households' the income source combined with farming seem to vary depending on the nature of rainfall in the wet season. When rainfall was above average, in 2011, most of the poorest households earned their income from farming and unskilled nonfarm employment. But when the rainfall was poor, in 2012, the poor derived their income from farming and unearned income sources. This indicates the importance of weather shock in determining the activities that households, particularly in the lowest income cohort, engaged in.

The observed income diversification patterns provide an insight to the relationship between diversification strategy and income group. In general, the pattern indicates that better-off farm households diversify into remunerative nonfarm activities while the poor diversify into low-return waged employments and transfer income sources. This indicates that differential access to asset endowments play an important role for the household's decision to pursue specific income diversification strategy. Hence, it

is important to identify factors that influence the household's decision to engage in particular income diversification strategy.

Table 7.3: Distribution of income diversification strategies across income quartile

	2011					2012				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
Rur-urban farm households										
Farm and skilled nonfarm	3	17	43	44	27	3	24	27	55	28
Farm and unskilled nonfarm	3	17	16	9	11	5	38	37	16	24
Skilled nonfarm	0	12	24	23	14	5	10	15	9	7
Unskilled nonfarm	3	9	9	5	6	10	5	12	7	8
Farm and transfer income	52	28	3	12	24	58	16	15	10	24
Transfer income only	38	17	3	7	16	19	7	3	3	8
Observation (N)	60	60	60	60	240	59	58	59	58	234
Rural households										
Farm and off-farm	0	5	2	2	2	0	0	0	0	0
Farm and skilled nonfarm	22	32	46	61	40	11	41	49	50	38
Farm and unskilled nonfarm	42	27	27	22	30	37	34	25	18	28
Skilled nonfarm	2	0	2	2	1	2	2	5	2	3
Unskilled nonfarm	5	7	5	0	4	0	2	4	4	2
Farm and transfer income	28	24	14	14	20	49	21	18	27	29
Transfer income only	3	2	0	2	2	5	0	0	5	3
Observation (N)	60	59	59	60	238	57	56	57	56	226

Note: Transfer income counts when the household has unearned income sources (e.g. productive safety net, direct supports, remittances, rents, pensions, etc.). Q1 is the first quartile, the group with the lowest income and Q4 is the highest income group. Missing observations are excluded. All figures are in percentages except observations.

7.5 Determinants of Income Diversification Strategy

The literature in rural Africa indicates that the household's choice of income diversification strategy is influenced by differences in capital (i.e. human, physical and financial) endowments, location and shocks (e.g. Dercon and Krishnan, 1996; Barrett et al., 2001a; Bezu and Barrett, 2012). These studies focus on rural households' income diversification strategy where a farm household tries to allocate

resources among viable activities to supplement the farm income or maximize expected utility under the rural economy. However, in the context of dynamic rural-urban livelihood transitions and in the presence of incomplete markets for land and credit, farm intensification may not be a viable strategy for peri-urban farm households. Hence, peri-urban farm households' income diversification strategies are restricted because the incentives and constraints they face are subject to the mechanics of the cash economy. The data in Table 7.3 support this hypothesis because almost no household entirely depends on farm income.

Most households use mixed strategies (i.e. farm and unskilled, farm and skilled, farm and unearned income sources) to support their living and very few depend on unearned sources or nonfarm employment. Hence for the regression estimation, three income diversification strategies are defined by regrouping the classifications in section 7.3.2, namely: i) farm and skilled nonfarm or skilled nonfarm only (FSNF); ii) farm and unskilled nonfarm or unskilled nonfarm only (FUNF); and iii) farm and transfer income or transfer income only (FTI)[63]. These three strategies are mutually exclusive meaning a household cannot pursue more than one strategy concurrently. Households that pursue FSNF strategy may earn income from unskilled nonfarm or transfer income sources but there should be at least one member of the household who earns income from skilled nonfarm employment. However, households in the FUNF group might earn income from all sources except skilled nonfarm activities and those under the FTI category are households involved in farming and earned from transfer income sources but not from the nonfarm sector. Distribution of the income diversification strategies, after regrouping, is given in Table 7.4. About 75% of rural households are engaged in the nonfarm sector while about 63% of the rur-urban farm households are engaged in the same sector but the reverse was expected to happen. But Table 7.3 shows that most households engaged in skilled nonfarm only in 2011 shifted to farming and unskilled nonfarm in 2012.

[63] Households that pursue a single income diversification strategy are very few in the data. By considering similarity of the activities, households that pursue single strategies are merged into households with mixed strategies. For instance, households engaged only in skilled nonfarm activities are merged with households that pursue farm with skilled nonfarm and the strategy is called as farm and skilled nonfarm or only skilled nonfarm. However, in the discussions emphasis is given to the mixed strategies for the sake of simplicity as well as the number of households partake mixed strategy are dominant in the group.

Presumably households realize that to engage in farming, such as dairy and vegetable production, is feasible and use their saving from skilled nonfarm. The other reason could be member of the household, who was participating in the self-employment, probably went bankrupt and joined the unskilled employment (see Table 4.6).

Table 7.4: Distribution of income diversification strategies by group

	Rur-urban			Rural		
	2011	2012	Average	2011	2012	Average
Farm and skilled/skilled (FSNF)	42	35	38	44	40	42
Farm and unskilled/unskilled (FUNF)	18	31	25	34	31	33
Farm and transfer/transfer (FTI)	40	33	37	22	29	25
Observations (N)	240	234		238	227	

Note: figures represent percentage.

Multinomial logit model is estimated to examine the factors that influence peri-urban farm household's decision to choose among the three income diversification strategies based on Maddala's (1983) random utility model. The dependent variable is the livelihood diversification strategy of the household which represents three mutually exclusive strategies. The explanatory variables are the household's demographic characteristics, asset holding, past diversification strategy, shocks experienced and the local economy.

The random utility model is given as follows:

$$\boldsymbol{U_{ij} = \eta_{ij} + \varepsilon_{ij}} \qquad 7.1$$

where U_{ij} represents the utility of j^{ih} strategy choice (i.e. in this case the three diversification strategies are defined) to i^{th} household, η_{ij} stand for the expected utility of i^{th} household for choosing j^{it} strategy and assumed to be a linear function of strategy invariant observables, and ε_{ij} is the random errors and are mutually exclusive. Households are assumed to choose a strategy that maximizes their utility.

Then the probability that household i chooses income diversification strategy j is given as

$$pr\ (Y_i = j) = pr\left\{ U_{ij} = max(U_{i1}, U_{i2}\ U_{i3})\right\}$$

$$= \ pr\left\{ \eta_{ij} + \varepsilon_{ij} > \max_{j \neq k}(\eta_{ik} + \varepsilon_{ik})\right\} \qquad 7.2$$

where pr stands for probability. Multinomial logit model instead of conditional logit model is used to estimate the odds ratio (the probability to pursue one strategy instead of the other) because the number of alternatives are very few and the explanatory variables do not vary with type of strategy adopted. Pooled cross-section data is used for the estimation because of small number of observations under each income strategy if the data is treated as panel data. Separate estimations are done for rur-urban and rural farm households. Table 7.5 and Table 7.6 reported the estimation results. The reported parameter estimates indicate the likelihood to utilize one strategy over another. The marginal effects associated with each variable, which indicates the effect of the percentage change of the variable on the likelihood of involvement in the activity, are reported in Annex 7.1 and Annex 7.2. Standard errors are adjusted to account for the stratification and clustering effects and, thereby, correct hetroskedasticity problems. Because farming is generally common for all the strategies, the discussions focus mainly on the household's decision to choose between skilled nonfarm, unskilled nonfarm and unearned income sources. Discussion of the estimation results is presented next.

7.6 Estimation Results and Discussions

7.6.1 Rur-urban Farm Households

Having more number of adults in the household increases the probability to partake in skilled nonfarm than transfer income sources (Table 7.5). This could be because the presence of more adults in the household possibly associated with some level of education or acquired skill which helps the household to be engaged in high-return nonfarm activities. This signals the existence of entry barriers to lucrative nonfarm activities. As expected, past experience in the nonfarm sector becomes a very strong

predictor of the household's activity engagement. The probability of partaking in nonfarm activity increases with the household's past experience in the sector. This partly signals that unobserved factors, such as occupation preferences, acquiring particular skills or social networks, play important roles in the household's decision to diversify in the nonfarm sector.

The amount of land compensation that the household received is positively and significantly associated with the likelihood to participate in skilled than unskilled nonfarm employment. But the effect is negligible because the effect is observed when land compensation increases by one million ETB (approximately about 52,000 USD)[64]. This is a significant sum of money and signals that the amount of money received as land compensation is not an important factor for the household to partake in high-return nonfarm employments. This partly suggests that finance is not a key factor for the household to engage in lucrative nonfarm activities. This by itself is an important policy issue generally in development and particularly in Ethiopia because the evidence shows that securing access to finance might not bring the desired outcome if not backed with the required knowledge and skills on how to use it.

Demographic features of the household head matter for the household to be engaged in a particular income diversification strategy. The possibility of diversifying into unearned income sources is higher for female headed households, households headed by older people or if the household head considers farming as a main job. Shocks that have the potential to affect the household's human capital - such as occurrences of illness, death, food shortages, divorce, separation, etc. - decreases a household's participation in the nonfarm sector but increase the probability to derive income from transfer income sources. These results suggest that labour constrained households diversify to unearned income sources such as remittances or productive safety net programs. Although weakly significant (at 10%), food or farm input price inflation increases the likelihood of partaking in unskilled nonfarm employment.

The size of local labour market becomes important for the probability of engaging in skilled or unskilled nonfarm employment. The likelihood to engage in unskilled

[64] Currently 1USD = 19.10 ETB

nonfarm activities is lower in Alamata, the base category, compared to the other places namely Mekelle, Adigrat and Axum. Perhaps this is due to the differences in the size of local labour market, because Alamata is the smallest urban area compared to the other three by all measures.

7.6.2 Rural Households

Similar to the rur-urban farm households, it appears that human capital matters in deciding to pursue skilled or unskilled nonfarm diversification strategies as illustrated in Table 7.6. The probability to be engaged in skilled nonfarm activities increases with the number of adults in a household or when the household head is literate. This partially suggests that the existence of entry barriers to the sector. Livestock holding is strongly and positively associated with skilled nonfarm activities but the effect is very small. Female headed households are less likely to pursue skilled nonfarm activities compared to male headed households. Households with larger landholdings are likely to diversify into unskilled rather than skilled nonfarm activities. This could be because these households undertake nonfarm employment as a part time job during the lean season while they are fully engaged in the farm activity in the peak season (i.e. the wet and harvest seasons).

Like the rur-urban farm households, the likelihood of earning income from transfer income sources increases when the head is older or considers farming as a main job. Occurrences of shocks play an important role in the household's decision of choice of income generating activity. Shocks that affect household labour (such as health problems, food shortage, separation, etc.) increases the probability of diversifying into transfer income sources whereas climate shocks (such as drought, flood, and heavy rain) increases diversification into unskilled nonfarm activities. The fixed effects of size of the local market matter for the household's decision to participate in the nonfarm sector. Compared to Alamata (the reference group), households in Mekelle are engaged in skilled nonfarm employments while households in Adigrat and Axum pursue low-paying nonfarm employments.

Table 7.5: Multinomial logit estimation results for rur-urban farm households

	FSNF vs. FTI		FSNF vs. FUNF		FUNF vs. FTI	
	Coef.	Robust Std.er	Coef.	Robust Std.er	Coef.	Robust Std.er
Household head characteristics						
Female headed (yes=1)	-0.65**	0.33	-0.16	0.31	-0.49	0.33
Age	-0.04***	0.01	0.00	0.01	-0.04***	0.01
Farming main job (yes=1)	-1.57***	0.33	0.26	0.32	-1.83***	0.35
literate (yes=1)	-0.32	0.33	0.39	0.37	-0.71*	0.39
Household capital/asset						
No. of adults	0.31**	0.15	0.05	0.17	0.26	0.17
No. of adults lower elementary	0.50	0.31	0.01	0.31	0.49	0.35
No. of adults upper elementary and above	0.11	0.18	0.04	0.20	0.07	0.20
Livestock owned in ETB (in 2010 prices)	-1.0e-05	1.4e-05	-1.2e-05	1.1e-05	-2.2e-05*	1.2e-05
Farm land owned (in *tsimad*)	0.05	0.10	-0.07	0.09	0.12	0.11
Land compensation in ETB	9.2e-06***	3.4e-06	6.4e-06**	3.2e-06	2.8e-06	3.8e-06
Received transfer income in 2006 (yes=1)	-0.15	0.28	-0.33	0.27	0.17	0.29
Employed in nonfarm sector in 2006 (yes=1)	0.83***	0.29	0.07	0.27	0.76***	0.31
Shocks experienced (yes=1)						
Food shortage, bankruptcy, divorce, etc	-1.08***	0.33	-0.45	0.35	-0.63*	0.33
Health problems or death	-0.43	0.34	0.59	0.37	-1.03***	0.39
Drought, flood, heavy rain	-0.78***	0.31	-0.34	0.34	-0.44	0.35
Property loss due to theft or conflict	-0.88	0.57	-0.82	0.54	-0.06	0.51
Food price, or farm input price increase	0.10	0.27	-0.47*	0.28	0.57*	0.30

Table 7.5: continued

	FSNF vs. FTI		FSNF vs. FUNF		FUNF vs. FTI	
	Coef.	Robust Std.er	Coef.	Robust Std.er	Coef.	Robust Std.er
Town: Alamata (base category)						
Mekelle	-0.49	0.47	-1.62***	0.63	1.13**	0.58
Adigrat	-0.99*	0.54	-1.59**	0.72	0.60	0.67
Axum	0.37	0.54	-0.80	0.71	1.17*	0.68
Constant	2.06	0.83	1.50	0.93	0.56	1.02
Number of observation		464				
χ^2 (40)		131.44				
Prob > χ^2		0.000				
McFadden (Pesudo) R^2		0.1765				
Log likelihood		-414.13				

Note: ***, **, and * represent at 1%, 5% and 10% significance levels respectively. The Independence of Irrelevant Alternatives (IIA) assumption test was done using the Hausman test. The test results are insignificant (p-value=0.99, 0.44 excluding FSNF, FUNF category respectively). Excluding FIT category chi2= -8.42 failed to satisfy the Hausman test but Seemingly Unrelated Assumption (suest) test is satisfied.

Table 7.6: Multinomial logit estimation results for rural households

	FSNF vs. FTI		FSNF vs. FUNF		FUNF vs. FTI	
	Coef.	Robust Std.er	Coef.	Robust Std.er	Coef.	Robust Std.er
Household head characteristics						
Female headed (yes=1)	-1.33***	0.54	-0.92***	0.36	-0.41	0.49
Age	-0.05***	0.01	0.01	0.01	-0.06***	0.01
Farming main job (yes=1)	-0.97**	0.47	0.02	0.35	-0.99*	0.47
literate (yes=1)	0.41	0.38	0.61*	0.32	-0.21	0.42
Household capital/asset						
No. of adults	0.31**	0.15	0.29**	0.13	0.03	0.17
No. of adults lower elementary	0.18	0.26	-0.08	0.22	0.26	0.28
No. of adults upper elementary and above	0.08	0.20	-0.15	0.16	0.23	0.21
Livestock owned in *ETB* (in 2010 prices)	-4.5e-05**	2.1e-05	8.4e-05***	3.2e-05	-1.3e-04***	3.4e-05
Farm land owned (in *tsimad*)	-0.05	0.09	-0.18*	0.10	0.13	0.10
Shocks experienced (yes=1)						
Food shortage, bankruptcy, divorce, etc	-0.53	0.40	0.44	0.39	-0.97**	0.43
Health problems or death	-0.81*	0.44	-0.50	0.41	-0.30	0.42
Drought, flood, heavy rain	0.35	0.42	-0.36	0.32	0.70*	0.41
Property loss due to theft or conflict	0.07	0.63	0.30	0.56	-0.23	0.69
Food price, or farm input price increase	-0.72**	0.33	-0.76***	0.28	0.04	0.34
Town: Alamata (base reference)						
Mekelle	1.16***	0.45	-0.03	0.42	1.19**	0.49
Adigrat	0.88	0.55	-0.60	0.51	1.48**	0.61
Axum	-0.68	0.57	-0.94*	0.55	0.26	0.57
Constant	2.99	1.04	-0.39	0.76	3.38	1.07
Number of observations	460					
χ^2 (34)	132.50					
Prob > χ^2	0.0000					
McFadden's (Pseudo) R^2	0.1845					
Log Likelihood	-398.97					

Note: ***, **, and * represent at 1%, 5% and 10% significance levels respectively. The Independence of Irrelevant Alternatives (IIA) assumption test was done using the Hausman test. The test result is insignificant (p-value=0.88, FUNF). Excluding FIT category chi2= -28.76 and failed to satisfy the Hausman test but Seemingly Unrelated Assumption (suest) test is satisfied.

7.7 Conclusion

Expansion of urban areas limits the availability of land for the peri-urban farming community and they are continuously being integrated into the urban economy as a result. Examining farm households' income diversification strategies in peri-urban areas matter for smooth rural-urban livelihood transition. The findings have drawn a picture of what the income diversification strategies of farm households in peri-urban areas look like. It appears that agricultural incomes continue to be important, even to the farm households with limited access to farmland and the pursuit of mixed (i.e. combining farm with nonfarm) strategies is the dominant income diversification strategy.

Farm households in the upper quartile derive their income from farm and skilled nonfarm employment. This suggests that policy makers should note the close relationship between farm and skilled nonfarm income, in particular, and farm and nonfarm, in general. Income shares from skilled nonfarm activities sharply increase with income quartiles as defined in terms of income per adult. In that sense, the lucrative nonfarm sector is dominated by better-off farm households and indicates the presence of entry barriers. The estimation outputs also substantiate this finding. Having large numbers of adults (labour) and past experience in the nonfarm sector improves the likelihood of partaking the diversification strategy that combines farm and skilled nonfarm activities. Female headed households and households headed by older people are poorly placed in the nonfarm sector, which is a concern.

Is financial capital a key factor for nonfarm employment opportunities and earnings? The evidence shows that financial capital (land compensation) is not important for the farm household's decision to participate in the skilled nonfarm sector in peri-urban areas. This suggests that granting money without the required skills and knowledge is ineffective for the peri-urban farm household to benefit from the emerging nonfarm employment opportunities. Policy makers should consider providing training and investment advice when revising and designing the land compensation packages.

Annex 7.1: Probabilities of involvement in the livelihood strategies for the Rur-urban farm households

a) Farm with skilled nonfarm employment

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hsex*	-.1041369	.0646	-1.61	0.107	-.230752	.022478	.324052
hage	-.0045471	.00191	-2.38	0.017	-.008293	-.000801	54.8234
hjob*	-.1867661	.06028	-3.10	0.002	-.304909	-.068623	.422712
hedu*	-.0044289	.06817	-0.06	0.948	-.138047	.12919	.374223
nadult	.0466876	.0319	1.46	0.143	-.015833	.109208	3.13408
lwelm	.0675335	.06181	1.09	0.275	-.053613	.18868	.342641
upelm	.0183964	.03943	0.47	0.641	-.058894	.095687	1.86316
rlval	-4.77e-08	.00000	-0.02	0.986	-5.2e-06	5.1e-06	6701.2
fland	-.0002755	.01961	-0.01	0.989	-.038714	.038163	1.58969
comp	1.93e-06	.00000	2.93	0.003	6.4e-07	3.2e-06	44271
other*	-.185137	.05957	-3.11	0.002	-.301893	-.068381	.204236
health*	-.0140394	.07137	-0.20	0.844	-.153931	.125852	.177586
climate*	-.1388404	.06154	-2.26	0.024	-.25946	-.018221	.283748
crime*	-.1857461	.09157	-2.03	0.043	-.365211	-.006282	.08276
price*	-.0348801	.0548	-0.64	0.524	-.142291	.072531	.554542
mekelle*	-.2308068	.10646	-2.17	0.030	-.439458	-.022155	.577467
adigrat*	-.2667733	.09321	-2.86	0.004	-.449454	-.084092	.15227
axum*	-.0621411	.12742	-0.49	0.626	-.311878	.187596	.158979
trans98*	-.0552038	.0556	-0.99	0.321	-.164175	.053768	.516317
nonfr98*	.1142329	.05571	2.05	0.040	.005037	.223429	.355218

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Note: hsex= female headed household (yes=1); hage= age of the household head; hjob= farming is main of the household head (yes=1); hedu= household head literacy (yes=1); nadult= number of adult in the household; lwelm= number of adults achieved lower elementary; upelm= number of adults achieved upper elementary and above; rlval= real value of livestock holding in ETB; fland=size of farmland in *tsimdi*; comp= amount of land compensation received in ETB; other= experience of separation, food shortage, etc shocks (yes=1); health= experience of health problems or death (yes=1); climate= experience of climate shock (yes=1); crime= experience of property loss due to theft or conflict (yes=1); price=experience of price increases of food items or farm inputs (yes=1); mekelle= location dummy (mekelle=1); adigrat=location dummy (adigrat=1); axum=location dummy (axum=1); alamata=location dummy (alamata=1): trans98= earned income from transfer in 2006 (yes=1); nonfr98= earned income from nonfarm employment in 2006 (yes=1).

b) Farm with unskilled nonfarm employment

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hsex*	-.0295091	.05183	-0.57	0.569	-.131088	.072069	.324052
hage	-.0033558	.00188	-1.79	0.074	-.007037	.000326	54.8234
hjob*	-.1820504	.04898	-3.72	0.000	-.27805	-.086051	.422712
hedu*	-.1013356	.06133	-1.65	0.098	-.221541	.01887	.374223
nadult	.0167269	.029	0.58	0.564	-.040107	.073561	3.13408
lwelm	.0419023	.05699	0.74	0.462	-.06979	.153595	.342641
upelm	.0017992	.03548	0.05	0.960	-.067738	.071336	1.86316
rlval	-3.26e-06	.00000	-1.77	0.076	-6.9e-06	3.4e-07	6701.2
fland	.0176718	.01676	1.05	0.292	-.015178	.050522	1.58969
comp	-4.47e-07	.00000	-0.76	0.449	-1.6e-06	7.1e-07	44271
other*	-.0232956	.05471	-0.43	0.670	-.130526	.083935	.204236
health*	-.1356401	.04868	-2.79	0.005	-.231048	-.040232	.177586
climate*	-.0085169	.05831	-0.15	0.884	-.122796	.105762	.283748
crime*	.0714245	.09611	0.74	0.457	-.116944	.259793	.08276
price*	.0984832	.04863	2.03	0.043	.003172	.193794	.554542
mekelle*	.2547507	.09144	2.79	0.005	.075528	.433974	.577467
adigrat*	.2339075	.14907	1.57	0.117	-.058268	.526083	.15227
axum*	.2085704	.15085	1.38	0.167	-.087084	.504225	.158979
trans98*	.0497235	.04692	1.06	0.289	-.042242	.141689	.516317
nonfr98*	.0550508	.04873	1.13	0.259	-.040456	.150557	.355218

(*) dy/dx is for discrete change of dummy variable from 0 to 1

c) Farm with transfer income sources

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hsex*	.133646	.06815	1.96	0.050	.000072	.267219	.324052
hage	.0079028	.00195	4.06	0.000	.004084	.011722	54.8234
hjob*	.3688165	.06264	5.89	0.000	.24604	.491593	.422712
hedu*	.1057645	.06861	1.54	0.123	-.028712	.240241	.374223
nadult	-.0634145	.02943	-2.15	0.031	-.121105	-.005724	3.13408
lwelm	-.1094358	.06314	-1.73	0.083	-.233188	.014317	.342641
upelm	-.0201956	.03599	-0.56	0.575	-.090735	.050344	1.86316
rlval	3.31e-06	.00000	1.25	0.210	-1.9e-06	8.5e-06	6701.2
fland	-.0173963	.02005	-0.87	0.385	-.056686	.021893	1.58969
comp	-1.48e-06	.00000	-2.10	0.036	-2.9e-06	-9.9e-08	44271
other*	.2084326	.06687	3.12	0.002	.077373	.339492	.204236
health*	.1496794	.07578	1.98	0.048	.001146	.298213	.177586
climate*	.1473574	.06597	2.23	0.026	.018057	.276658	.283748
crime*	.1143216	.11275	1.01	0.311	-.106672	.335315	.08276
price*	-.063603	.05403	-1.18	0.239	-.169507	.042301	.554542
mekelle*	-.0239439	.0898	-0.27	0.790	-.199957	.152069	.577467
adigrat*	.0328658	.11676	0.28	0.778	-.195979	.261711	.15227
axum*	-.1464294	.08856	-1.65	0.098	-.320013	.027154	.158979
trans98*	.0054803	.05526	0.10	0.921	-.10282	.11378	.516317
nonfr98*	-.1692837	.05235	-3.23	0.001	-.271889	-.066679	.355218

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Annex 7.2: Probabilities of participation in the livelihood strategies for the rural households

a) Farm with skilled nonfarm

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hsex*	-.2551054	.0786	-3.25	0.001	-.409164	-.101047	.254927
hage	-.0018886	.00276	-0.69	0.493	-.00729	.003513	48.8705
hjob*	-.0747288	.08154	-0.92	0.359	-.234543	.085085	.646769
hedu*	.1339657	.06906	1.94	0.052	-.001386	.269317	.45181
nadult	.0734233	.02827	2.60	0.009	.018024	.128823	3.24468
lwelm	.003497	.04664	0.07	0.940	-.087914	.094908	.526252
upelm	-.0179204	.03568	-0.50	0.616	-.087856	.052015	1.67749
rlval	9.55e-06	.00001	1.65	0.099	-1.8e-06	.000021	7192.74
fland	-.0331537	.02059	-1.61	0.107	-.073501	.007193	2.7025
other*	.0056235	.0815	0.07	0.945	-.154121	.165368	.153204
health*	-.1488309	.08393	-1.77	0.076	-.313322	.01566	.125823
climate*	-.0334052	.07288	-0.46	0.647	-.17625	.10944	.249628
crime*	.0535571	.12189	0.44	0.660	-.185337	.292451	.064103
price*	-.1836885	.05977	-3.07	0.002	-.300826	-.066551	.514252
mekelle*	.1029293	.09017	1.14	0.254	-.073805	.279664	.564281
adigrat*	-.043604	.11276	-0.39	0.699	-.264613	.177405	.256988
axum*	-.2022979	.10581	-1.91	0.056	-.40969	.005094	.165559

(*) dy/dx is for discrete change of dummy variable from 0 to 1

b) Farm with unskilled nonfarm

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hsex*	.1029393	.07557	1.36	0.173	-.04518	.251058	.254927
hage	-.006276	.00258	-2.43	0.015	-.011333	-.001219	48.8705
hjob*	-.0608879	.07458	-0.82	0.414	-.207054	.085278	.646769
hedu*	-.1110996	.06805	-1.63	0.103	-.244478	.022278	.45181
nadult	-.0443154	.02879	-1.54	0.124	-.100742	.012112	3.24468
lwelm	.0288297	.04636	0.62	0.534	-.062036	.119695	.526252
upelm	.0391687	.03522	1.11	0.266	-.029862	.108199	1.67749
rlval	-.0000216	.00001	-3.13	0.002	-.000035	-8.1e-06	7192.74
fland	.0371397	.0199	1.87	0.062	-.001857	.076136	2.7025
other*	-.1261115	.06667	-1.89	0.059	-.256787	.004564	.153204
health*	.0506638	.08252	0.61	0.539	-.111081	.212409	.125823
climate*	.1031648	.06934	1.49	0.137	-.032747	.239077	.249628
crime*	-.0603931	.10857	-0.56	0.578	-.273182	.152396	.064103
price*	.1231438	.05693	2.16	0.031	.011554	.234734	.514252
mekelle*	.0834519	.0859	0.97	0.331	-.084907	.251811	.564281
adigrat*	.1889648	.11754	1.61	0.108	-.04141	.41934	.256988
axum*	.1685742	.11822	1.43	0.154	-.063125	.400274	.165559

(*) dy/dx is for discrete change of dummy variable from 0 to 1

c) Farm with transfer income sources

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hsex*	.1521661	.08902	1.71	0.087	-.022304	.326636	.254927
hage	.0081647	.00194	4.21	0.000	.004361	.011968	48.8705
hjob*	.1356167	.05483	2.47	0.013	.028153	.243081	.646769
hedu*	-.0228661	.05418	-0.42	0.673	-.129055	.083323	.45181
nadult	-.0291079	.02166	-1.34	0.179	-.071551	.013335	3.24468
lwelm	-.0323267	.03712	-0.87	0.384	-.105087	.040433	.526252
upelm	-.0212483	.02819	-0.75	0.451	-.07649	.033994	1.67749
rlval	.0000121	.00000	3.55	0.000	5.4e-06	.000019	7192.74
fland	-.003986	.01272	-0.31	0.754	-.028924	.020952	2.7025
other*	.120488	.07011	1.72	0.086	-.016922	.257898	.153204
health*	.0981671	.07131	1.38	0.169	-.041597	.237931	.125823
climate*	-.0697596	.04907	-1.42	0.155	-.165932	.026412	.249628
crime*	.006836	.09158	0.07	0.940	-.172656	.186328	.064103
price*	.0605447	.04653	1.30	0.193	-.030649	.151738	.514252
mekelle*	-.1863812	.06756	-2.76	0.006	-.318801	-.053961	.564281
adigrat*	-.1453608	.0509	-2.86	0.004	-.245126	-.045595	.256988
axum*	.0337237	.08159	0.41	0.679	-.126198	.193646	.165559

(*) dy/dx is for discrete change of dummy variable from 0 to 1

CHAPTER 8: SUMMARY OF RESULTS, POLICY IMPLICATIONS AND CONCLUSIONS

8.1 Introduction

The study was set out to investigate the effects rapid urban expansion and the associated policies on welfare of farm households in the peri-urban areas. It focused particularly on the changes on welfare of farm households in the peri-urban villages who are in the course of rural-urban livelihood transitions. It viewed this in the context of developments of their consumption expenditures, asset holdings and employment patterns. It attempted to bring a wide range of relevant literature to examine the implications of rural (urban) household welfare assumptions apply to farmers' livelihood adaptations in peri-urban villages. In doing this, it sought to identify the extent to which the perceived assumptions work to the reality of the farm households in the state of rural-urban livelihood transitions.

The research focused on the welfare (as measure in consumption expenditure) and income diversification strategies of subsistence farm households in peri-urban villages of Tigray Regional State, Ethiopia. As has been discussed, urban areas of Tigray region are expanding at a rapid rate and have experienced substantial growth in population and area size since mid 1990s. The discussion described and analyzed a wide range of socio-economic issues of Tigray region and the procedures followed to select the sample farm households. Methodologically, the research was developed and undertaken with a view to quantify the effect of urban expansion on welfare of the peri-urban farm household and to identify main contributing factors to the welfare and livelihood diversification strategies.

The analysis was accomplished by adapting unitary household model and the farm household's production decision framework in the context of peri-urban areas. Based on the data analyzed in the foregoing chapters, four to seven, it is apparent that urban expansion in Tigray has led to transformation of the peri-urban areas in physical, social and economical terms. These transformations resulted in differential effects on the livelihood outcomes of the peri-urban farm households. The relationships between welfare, asset holdings and income diversification decisions

of the peri-urban farm households and factors internal and external to the households have identified. The findings show that the farm households in urban have lost their assets and have low participating in the emerging employment opportunities. Furthermore, it also identified skill rather than money is the crucial factor for the farm household to engage in high-paying nonfarm activities. By doing this, the analysis shows that urban-driven poverty is being evolved in the peri-urban areas. The findings contradict with the current wisdom of the literature and need further research.

This chapter is devoted to summarize the main findings and conclusions drawn throughout the body of the thesis. It attempts to bring them together and reflect in the light of the research objectives. It suggests further areas of study and includes recommendations on areas of action to mitigate the hurdles of smooth rural-urban livelihood transitions and to alleviate poverty.

8.2 Main Findings

Although the shift from rural to urban lives in peri-urban areas is at its early stage, the preceding chapters confirmed that peri-urban development in Tigray Regional State is rapid and has effects at meso and micro level. The meso level effects include changes in: livelihood; land price and administration; and the socio-economic composition at the sub-village level. The micro level effects are evident in the effects on welfare and asset holding at the farm household level. A summary of the observed effects is presented next.

8.2.1 Meso Level Effects

The evidence in chapter four demonstrates that population density has increased and new migrants have moved from the urban centre to the peri-urban sub-villages within the urban boundary. As a result, composition of the local population has changed from predominantly subsistence farmers to mainly civil servants, business people and waged laborers. This create a heterogeneous communities and forms livelihoods where livelihoods of the pre-existing farm households shifted from

simple rural to complex urban livelihood settings, with an influx of households of diverse socio-economic backgrounds.

Urban expansion affects access to basic urban infrastructures and improved housing. The engulfed pre-existing rural villages have better access to transport, electricity, and telephone services and other urban amenities compared to other nearby rural villages. Peri-urbanization has increased the stock of housing with varying size and quality. The new-comers (in-migrants) built standardized houses ranging from small villas to one-story houses based on the planning standards of the town municipality. The pre-existing inhabitants (rur-urban farm households) renovated or rebuilt their existing houses with some modifications but not necessarily according to the planning standard. As far as the quality of the houses is concerned, peri-urban Tigray has a combination of newly built standardized houses owned by in-migrants and sub-standard houses that belong to the pre-existing rural inhabitants. But no expansion of commercial farming to supply the town market is observed. This contrasts with other studies that characterize peri-urban areas of Africa, such as in Tanzania, which are established by squatters, low-income migrants and unregulated development (Kombe, 2005).

Arable lands of the peri-urban villages are converted to nonfarm urban-based activities. Land allocation decisions in peri-urban Tigray as well as in Ethiopia more generally, by the law, is done by the respective local authorities. The land administration system is changed from rural to urban authorities for the rur-urban villages. New land price is in place and the land prices differ from town to town, and sometimes within the town, depending on the interests of land developers and land price speculators. Physical assets, mainly farmland and other communal lands, are converted into money.

Whenever land was allocated for investment or development purposes, households received financial grants for the land they were dispossessed-of which led to the commoditization of land and housing in PUAs. The land compensation package practiced so far grants money to the affected households but is not accompanied with any packages that address the issue of how to utilize the money in productive ventures. The land compensation package lacks interventions that can equip the

dispossessed farmers to take advantage of the urban market opportunities. In contexts where financial and credit markets are missing or malfunctioning, granting money without the required knowledge is ineffective. The analysis in chapter 6 and chapter 7 of this thesis demonstrated that the land compensation money has an insignificant role for the farm households' welfare and income diversification decisions.

Additionally, development priorities (intervention packages) of the respective authorities shifted from rural dominated activities to urban driven and based activities. In the course of the transition from rural subsistence crop production systems to urban economic systems, the local authorities failed to design intervention packages that properly promote the skills and knowledge of the peri-urban farm households. Similarly, unclear roles and weak linkages between the government agencies contribute to the peri-urban farm households' failure to benefit from the opportunities of urban food market. For instance, local authorities and development agents could have designed and implemented interventions to upgrade the farmers' knowledge and skills thus enabling them to benefit from the urban market for vegetables and dairy products.

8.2.2 Effects at Micro Level

The empirical chapters, chapter 5 to chapter 7, of this thesis examined the effects of peri-urbanization at the household level with the main focus being on welfare and income diversification strategies of the farm households in PUAs.

Welfare as measured by consumption expenditure: consumption expenditure is employed as a proxy to household welfare. The effect of peri-urbanization on welfare of the affected farm household was estimated by applying the propensity score matching methods using the farm households in PUAs but under rural administration as a control group. The results show that peri-urbanization has led to a significant reduction of consumption expenditure of the farm households in PUAs incorporated in the urban administration (see chapter five). This in turn shows that poor farm households cut their food consumption and led difficulty in covering their food expenditures because food expenditure comprises of about 80% of their total

consumption expenditure. The results imply that the farm households incorporated to the urban administration would have been in a better condition had they been continued living under the rural administration, given all the privileges that the rural household have such as farmland and the different development packages.

Additionally, consumption expenditure of the affected farm (rur-urban) households appears to be based on asset depletion in contrast to the rural households. This is because ownership of the productive assets such as livestock and land has reduced for the rur-urban farm households while the rural households' livestock holding has increased and no change in size of farmland. Housing is one of the productive assets in urban areas. But the analysis indicates that there is no significance difference in the average number of rooms owned by the rur-urban and those owned by rural households in PUAs. Similarly, the average number of rooms owned by the rur-urban farm households did not show significant difference between 2006 and 2012 which is an indication of no investments on additional houses. This again substantiates the idea that consumption expenditure is based on asset-depletion because no investments made that potentially replace the lost assets. Although peri-urbanization is at an early stage, the evidence shows that the rur-urban farm households are, on average, at a disadvantage. On the other hand, studies indicate that moving-out of poverty is difficult in urban Ethiopia (Bigsten and Shimeles, 2008). Hence, the analysis indicates that urban-driven poverty seems to be gradually developing in the peri-urban areas.

Associates of consumption growth and vulnerability: chapter 6 captures the factors associated with welfare of the farm households in PUAs by grouping the farm households into two groups – rur-urban and rural – depending on their administrative boundary. Subjective and objective welfare indicators are used to identify the influential factors of welfare change of the household; and to examine if the factors are different among the groups and among the type of welfare indicators. The objective welfare indicator represents the consumption growth of the household expressed in real consumption expenditure per adult and the subjective welfare represents the level of poverty as perceived by the household. The latter welfare measure has the potential to capture other aspects of the household welfare other than food deprivation. Mankiw et al.'s (1992) growth model was adapted to model

the household's consumption growth. Random effect and multinomial logit models were employed to estimate partial effects of the factors associated with the household's objective and subjective welfare indicators, respectively.

Looking at the rur-urban households, both welfare indicators show female headed households and households with more dependents have lower welfare and have high probability to fall into poverty. Similarly, literacy of the household head has a significant role in the household's welfare where households headed by literate people are more likely to enjoy better welfare. Size of the local economy also becomes an important factor. For instance, rur-urban households in peri-urban Mekelle are less likely to fall-back into poverty compared to those in Alamata. The effects of livestock holding and land compensation money are inconclusive on the subjective welfare and negligible on the objective welfare of the farm household. Having large number of adults in the household decreases the consumption expenditure of the household. Hence, gender and education of the household head and size of dependents strongly influence both, objective and subjective, welfare indicators of the rur-urban household in similar ways.

In the case of rural farm households, no common factors are identified that significantly affect both welfare indicators. Share of nonfarm income, household head literacy, family size, incidence of price shock and size of local market are the important factors that affect consumption growth – the objective welfare indicator – of the household (see Table 6.6). These factors are positively associated with the welfare of the farm households except family size. The subjective welfare is associated positively with size of farmland and share of farm income while it is negatively associated with livestock holding of the farm household (see Table 6.9). The results show that the factors associated with both welfare indicators are different. The estimation results of the objective welfare capture the effects of diversified factors while that of the subjective welfare are mainly related to farm income. The negative association of livestock with the subjective welfare could be due to the incidence of climate shock which severely affects the livestock production and is not easy to recover what is lost.

The analysis, therefore, demonstrates that literacy of the household head, family size and size of the local market matter for the welfare of the farm households in PUAs. Similarly, gender of the household head is important in the household's welfare but only in the case of rur-urban households which again signals that female headed households need special attention in the course of rural- urban livelihood transitions. These factors have to be considered in designing the targeted interventions by the development agents such as the government and NGO's.

Income source and diversification strategies: chapter seven is devoted to an examination of the household's income source and income diversification strategies across income quartile and group. The analysis is based on Reardon et al.'s (2007b) farm household decision to diversify into nonfarm framework and Maddala's (1983) random utility model. The evidence shows the farm households derive their means of living from different sources (see Table 7.1 and Table 7.3). All farm households in both groups – rur-urban and rural – are engaged in multiple activities regardless of their income group and their administrative boundary. The share of income earned from skilled nonfarm activity is positively related to the household's total income of the farm households in PUAs. This indicates that the presence of entry barriers in the sector. Additionally, combining farming with skilled nonfarm employment is the dominant strategy for households in the upper income cohorts and is common to both groups. But no common strategy is observed for the households in the lower income cohorts of both groups: i) the dominant strategy for the poor rur-urban farm households is combining farm and transfer income sources; while ii) combining farm and unskilled nonfarm employment for the rural households. This implies that production behaviour of the better-off farm households in PUAs is similar regardless of the administrative boundary they belong to whereas for the poor it is different.

Three broad income diversification strategies such as i) farm and skilled nonfarm (FSNF), ii) farm and unskilled nonfarm (FUNF) and iii) farm and transfer income (FTI) were generated from the survey data. Factors such as the household head's gender, age, literacy and main job play key roles in the likelihood of pursuing FSNF strategy. The probability to partake FSNF rather than FTI is higher when the household head is male, younger and literate. Similarly, education of the household

head matters for the farm household to adopt the FSNF strategy. Therefore, the evidence suggests that female headed households and households headed by older people are at disadvantage in the urban labor market. Incidence of shocks such as health and food shortage lower the household's participation in the nonfarm sector in general.

8.3 Theoretical and Policy Implications

8.3.1 Theoretical Implications

The analysis shows that the production behaviour of the farm households in PUAs is different for the poor farm households although it is similar for the better-off ones. This implies that the poor face different constraints in their production decisions than the better-off households and diversification strategies to survive in and cope with the dynamic changes in peri-urban areas. Hence, the theoretical foundations of income diversification strategies need to be revisited to understand the dynamic linkages of the peri-urban transformations, in the context of rapid urbanization and commoditization of land, and the production behaviors of the subsistent farmers in the peri-urban zone.

8.3.2 Policy Implications

The findings show that most of the farm households are engaged in agriculture although urban expansion limits access to farmlands in peri-urban Tigray; urban expansion seems to increase the poverty levels of rur-urban farm households; and the farm households in PUAs have differential access to emerging employment opportunities. The policy implications are grouped according to the required plans and interventions necessary to mitigate the problems. The main policy implications drawn from the findings are the need to: i) develop of integrated policies; ii) target the vulnerable group; and iii) improve the existing policies and institutions.

Development of integrated policies: agriculture is still the source of living for the majority of rur-urban farm households in Tigray. More than half of the farm households in the upper income cohort and about 40% of the peri-urban farm

households earned their income sources from farming and skilled nonfarm activities. Income from skilled nonfarm activities helps the household to invest in farming, for instance purchasing of improved inputs and hiring farm labor. Similarly, surplus income from farming helps the household to invest in upgrading skills and existing ventures in the nonfarm sector, such as investing on vocational trainings, housing and higher education. The observed positive relationship between farm and skilled nonfarm income cannot be seen in isolation in peri-urban Tigray. Integrated programmes and policies should be developed to reinforce the existing linkages between the two. This indicates that MoARD ought to encompass opportunities of the nonfarm sector in designing the development extension programmes. Equally MoWUD should incorporate opportunities of urban agriculture, such as production of leafy vegetables and dairy, in the urban development packages in the light of the advantage associated with a proximity to urban consumers. Both ministries, MoARD and MoWUD, should develop joint plans to address the farm households in peri-urban areas in particular and the peri-urban development generally. This should reflect clearly defined roles and responsibilities of the ministries which would enable the farm households to benefit from the emerging employment opportunities.

Targeting the vulnerable groups:- results of the analysis show that female headed household and households headed with older people are the most disadvantaged households in the rur-urban Tigray. These groups are generally categorized as labor and resource poor households. They lack the required capital or input to participate in the nonfarm sector and/or access alternative employment options. Special programmes should be designed to empower the labor poor households, female headed households and households headed by older people. Given the farm households' knowledge and skills, intervention packages that focus on agricultural intensification particularly in dairy production and home gardening are potentially feasible. These activities enable the farm household to engage income generating opportunities which in turn facilitate to improve their food security and play their role in sustaining urban food production. This can be realized by establishing community production centers and family gardens in individual houses with special packages on rain water harvesting schemes especially for drought prone areas.

Youth unemployment and underemployment is also prevalent in peri-urban areas. The local urban and rural authorities together organize and facilitate capacity building training programmes that focus on agro-processing and other secondary and tertiary production activities.

Improving the existing policies and institutions:- The current land policy generally provides financial incentives to the household (individual) dispossessed from their property. The land compensation schemes have to incorporate other packages such as guidance and trainings on how to utilize the land compensation money on productive ventures. Additionally, the land compensation package has to be transparent as well as take into account issues such as investments made on farmlands, inflation, fragmented landholding systems and equity. The local urban and rural authorities should have to share their area of expertise, collaborate in allocating resources and work together across the urban-rural administrative boundaries. Additionally, it is important to delimit the peri-urban zone with clear development plans and strategies and agencies responsible to promote the transformation.

8.4 Further Research

The study has provided important insights on the welfare of the peri-urban farm households in their course of urban-rural livelihood transitions and integration into the urban economy. The areas for future research include inter-temporal welfare dynamics, risk management behaviour, regional comparative analysis and social capital. The analysis shows that poor farm households are at a disadvantage and become more vulnerable. It is possible for households to move in out of poverty over a period of time in their endeavor to adjust to the urban economy. Hence, investigating the inter-temporal welfare dynamics, risk and discount preference of the households can help to understand the main contributing factors and distinguish the production behaviours of persistently poor and structurally poor households.

The other important issue, which is highlighted in this thesis, is the significance of conducting comparative analysis on regional basis. Ethiopia is a federal state and

every regional state has its own culture, customs and natural resources which, again, will shape the production behaviour of peri-urban farm households and, therefore, will implicitly play a role in the differential access to assets and urban labour integration of households. This will help to capture the relationships between geographical variations and the households' risk perception variation which, ultimately, help to design regional adjustments. The social capital of the pre-existing social structures and institutional setups might be affected by the rural-urban livelihood transitions and urban labor integrations. Similarly, personal relationships and networks might play a role in the household's new livelihood adaptation and production decisions.

8.5 Conclusion

Countries in sub-Saharan Africa are undergoing an unprecedented rate of urbanization and are going to do so for some time in the future. However, the distinction between rural and urban is still persistent in the development and planning systems of many developing countries which can often suppresses the strong rural-urban linkages in the PUAs. The purpose of this study was to investigate the effects of peri-urbanization on welfare and income diversification strategies of pre-existing farm households in PUAs. The analysis shows the rapid expansion of urban areas leads to the transformations of the pre-existing communities in PUAs in all aspects. The findings show that the farm households in urban have lost their assets, have low participating and are marginalized in the emerging employment opportunities.

The study has shown that welfare of the dispossessed (rur-urban) farm households has decreased on average and agriculture is still the main source of living for most of the farm households, although access to farmland is limited. The negative effect is serious particularly in terms of food security of the poor households because about 80% of their expenditure is spent for food consumption. Having previous experience in the nonfarm sector rather than money played a positive role for the rur-urban farm household in engaging in the lucrative nonfarm activities. This outcome is against the general wisdom of the current literature and further research in this area will

clarify its meanings and influences. The labor poor households, particularly the female headed and those headed by older person, are not benefiting from emerging employment opportunities. The evidence has also showed that the better-off households mostly adopt combining farm and skilled nonfarm employment strategies. This, in turn, indicates strong linkages between the two employment strategies.

The study has also identified important issues for policy makers and development agents in order to mitigate livelihood transformations and ensure sustainable urban development. Firstly, urgent action has to be taken by the local authorities, both urban and rural jointly, to address the considerable level of youth unemployment and underemployment. Secondly, urban development planners have to reflect and incorporate the specific features of peri-urban livelihoods in their strategies; and design urban safety net programmes to improve the productive capacity of the labour poor households and to provide further protection. The other pertinent issue that needs attention is to define the peri-urban zone and designing development policies and strategies at country level, accordingly.

GLOSSARY

Derg: is name of a socialist ruling party which governed Ethiopia from 1974 to 1991.

Developing Countries: represents low income and middle income countries but they can be at different levels of development.

Ketema: a term usually used to represent any urban center in Ethiopia. Although no uniform criteria is set at national level, adjectives such big, medium and small are usually used to represent the relative size of the respective urban center.

Kushet: is a local term used to represent a sub-village.

Peri-urban areas: in this thesis indicates the pre-existing rural villages adjacent to urban areas within the radius of 15 kilometers from the boundary of existing urban built up. The peri-urban villages can be under urban or rural administration.

Peri-urbanization: is the development of peri-urban areas into urban proper.

Rur-urban: a word created by the author by combining two words – rural and urban – to represent the pre-existing rural villages of peri-urban areas but incorporated into urban administration because of urban expansion.

Tabia: is the lowest official administrative unit and equivalent to a village. It is also locally known as *kebelle*.

Tsimdi: is a local unit used to measure size of farmland which is equivalent to a quarter of a hectare.

Woreda: is an administrative unit which is equivalent to a district.

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Annex 3. 1: Household Questionnaire

Peri-urban Farmers Livelihood Diversification Survey: Tigray, Northern Ethiopia

City/town: _____

Woreda: _____

Kebele/Tabia: _____

House number: _____

Interviewer: _____

Date: _____

Checked by: _____

Household Code

Part I: Household Demographics

1) Basic Household Information in 1998EC (2006)

Please include all members of the household, who usually lived in the same house (including servants) in 1998EC.

ID Code	1. What is the relationship with the household head? **Code(1a)**	2. Sex **Male=0 Female=1**	3. Age (in years) **If age<1, age=0**	4.Marital status **Code(1b)**	5. Religion **Code(1c)**	6. Employment status **Code(1d)**	7. Can [name] read? **Yes =1 No =2**	8. Can [name] write? **Yes =1 No =2**	9. Does [name] have an adult literacy program certificate? **Yes =1 No =2**	10. Has [name] ever attended/ was attending school? **Attending school = 1, GoTo Q12 Has attended =2 , GoTo Q12 No = 3, GoTo Q11**	11. Reasons for not attending school? **Code (2a)**	12. What was the highest grade completed? **Code (2b)**

2) Basic Household Information in *Tahsas* 2003EC:

Please include all members of the household, who usually live in the same house (including servants) currently.

ID Code	1. What is the relationship with the household head? **Code(1a)**	2. Sex **Male=0 Female=1**	3. Age (in years) **If age<1, age=0.5**	4.Marital status **Code(1b)**	5. Religion **Code(1c)**	6. Employment status **Code(1d)**	7. Children born since last December 1998EC		8. If new entrant since last December 1998EC		9. If left the household since last December 1998EC		
							Relation to the head **Code(1a)**	Is the child still alive? **Yes=1 No=2**	How or why enter to the household? **Code(1e)**	Where was the main residence before? **Code(1f)**	Name	How or why did leave the household? **Code(1g)**	Where is the main residence now? **Code(1f)**

10. What is the walking distance to the city/town center [single trip] in minutes? _____

11. What is the walking distance to the nearest elementary school grades 1-4, [single trip], in minutes? _____

12. What is the walking distance to the nearest elementary school grades 5-8, [single trip], in minutes? _____

13. What is the walking distance to the nearest Secondary school [single trip] in minutes? _____

3. Education

To be filled for all members of the household who are **six years old and above**

ID Code	1. Has [name] ever attended? OR Is[name] attending school? **Attending school = 1** **Has attended =2** **No = 3, GoTo Q3**	2. What was the highest grade completed? **Code (2b)**	3. Reasons for not attending school now or ever? **Code (2a)**	4. Can [name] read and write? **Yes =1** **No =2**	5. Does [name] have an adult literacy program certificate? **Yes =1** **No =2**

4. Migration Information

1. Did any member of the household migrate since last ***Tahsas*** 1998EC?

Yes=1, **No=2**, **GoTo Part II**

If yes, please fill the table for those migrated

Name	2. Where did [name] moved?	3. Where did [name] live before moving? **Code (3a)**	4. Job of [name] prior to leaving the village? **Code (3b)**	5. Was [name] married at that time? **Yes = 1,** **No = 2, Go To Q7**	6. Did [name] spouse or children stay behind when [name] moved? **Yes = Code (3c)** **No =0**	7. Who made the decision to move? **Code (3d)**	8. What was the main reason for moving? **Code (3e)**	9. If moved for work, did [name] have any information about opportunities for employment? **Yes= 1** **No=2**

Name	10. What was the source of this information? **Code (3f)**	11. For how long was [name] in city/town before a job was found? **If Unemployed, NEXT PERSON**	12. Type of the 1st job [name] obtained			13. What is [name]'s current job, if different from the first?			14. What is [name]'s gross monthly income from the current job?
			Employment status Code (3b)	**Sector/ industry Code (3g)**	**Occupation**	**Employment status Code (3b)**	**Sector/ industry Code (3g)**	**Occupation**	

Part II: Food and Nonfood Expenditure

1. How many meals per day did the household eat last week? (Give numbers for each group)

		No. of meals
Adults	Females	
	Males	
Children		

2. Did any member of the household who were away last week, or who for any reason did not eat with you last week? _____

Yes = 1, provide details **No = 2**

ID code								
Number of meals not eaten with the household (write 77 if the person eats from a different stock of food than that of the household)								

3. Did any people who are not living with the household but share meal with you in last week?_____ **Yes = 1, provide details** **No = 2**

		No. of people	No. of shared meals
Adults	Females		
	Males		
Children			

4. Has any member of the household consumed prepared food or eaten elsewhere against any payment last week? _____ **Yes = 1, Provide details** **No = 2**

ID code	**Weekly Consumption in Birr**

5. Food Expenditure and Consumption

I) Monthly Purchase and Weekly Food Consumption

Food type		1. What quantity of … was purchased in the last thirty days? How much was spent?		2. Quantity and value of … consumed in the last seven days and breakdown from each sources?									
		Total Amount **[Kg/Lt]**	Monthly expenditure (Birr)	**Total consumed**		**Purchased (Birr)**		**Own produce**		**Aid**		**Gift/transfer**	
				Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]
Cereals													
Teff													
Barley													
Wheat													
Hanfets													
Maize													
Sorghum													
Finger millet													
Pulses													
Lentil	*Difin*												
	Kik												
Cow pea	*Difin*												
	Kik												
Chick pea													
Horse bean													
Shiro													
Guaya													
Others(specify)													
Spices													
Berbere													
Salt													
Onion													
Garlic													
Ginger */Zingible*													
Others(specify)													
Cooking oil													

Food type	1. What quantity of … was purchased in the last thirty days? How much was spent?		2. Quantity and value of … consumed in the last seven days and breakdown from each sources?									
	Total Amount **[Kg/Lt]**	Monthly expenditure (Birr)	**Total consumed**		**Purchased (Birr)**		**Own produce**		**Aid**		**Gift/transfer**	
			Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]
Animal Products												
Beef												
Mutton												
Chicken (number)												
Egg (number)												
Fish												
Milk and Milk Products												
Milk/Ergo												
Cheese (Ayib)												
Butter												
others												
Processed Food												
Bread												
Fino (wheat powder)												
Pasta												
others												

Food type	1. What quantity of … was purchased in the last thirty days? How much was spent?		2. Quantity and value of … consumed in the last seven days and breakdown from each sources?									
	Total Amount **[Kg/Lt]**	Monthly expenditure (Birr)	**Total consumed**		**Purchased (Birr)**		**Own produce**		**Aid**		**Gift/transfer**	
			Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]
Vegetables												
Potatoes												
Tomatoes												
Carrot												
Green pepper												
Cabbage												
Beet root												
Others												
Fruits												
Orange												
Banana												
Papaya												
Mango												
Mango apple												
Pine apple												
Avocado												
Zeithuna												
Tirngo												
others												

Food type	1. What quantity of … was purchased in the last thirty days? How much was spent?		2. Quantity and value of … consumed in the last seven days and breakdown from each sources?									
	Total Amount **[Kg/Lt]**	Monthly expenditure (Birr)	**Total consumed**		**Purchased (Birr)**		**Own produce**		**Aid**		**Gift/transfer**	
			Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]	Amount **[Kg/Lt]**	Value [Birr]
Drinks and Stimulants												
Siwa												
Miyes												
Areki												
Soft drinks												
Beer												
Other liquor												
Coffee												
Tea												
Chat												
Cigarettes												
Other Consumables												
Sugar												
Honey												

3) Did the household experience food shortage in the last 12 months? _____

Yes = 1 No = 2, **GoTo Non-food expenditures part.**

4) If yes, for how many months did the household experience food shortage? _____

5) How did the household cover the food gap? _____ **[Multiple answers up to three, write them in level of importance]**

1 = Sale assets 2 = Loan from friends/relatives 3 = Participate in Safety net program 4= Received food aid

5= others (specify, write the reason on the given space)

6. Non Food Expenditures

1. Provide details of household expenditures paid for any non-food items or contributions made **in the last 30days.**

Item	Code	2. Total expenditure (Birr) last month	3. Of the total expenditure, how much was from own, gift or others sources		4. How many times did you make such purchases during the year 2003E.C?	Remark
			Own expenditure	Gift or others		
Clothes/shoes/fabric for men						
Clothes/shoes/fabric for women						
Clothes/shoes/fabric for girls						
Clothes/shoes/fabric for boys						
Linens (sheet, towels, blankets)						
Kitchen equipment(cooking pot, etc)						
Lamp/torch						
Matches						
Batteries						
Candles						
Bulbs						
Charcoal						
Fuel wood						
Kerosene						
Laundry soap/omo						
Hand soap						
Other personal care goods						
Building materials to (construct/renovate house)						
Ceremonial expenses						
Contribution to *Edir*						
Contribution to *Mahber*						
Donation to religious institutions						
Other contributions (Unions, Associations)						
Water bill						
Electricity bill						
Telephone bill/ pre-paid mobile phone						
Others (specify)						

Household's **School and Medical Expenditure** details in the last 30 days.

6. Did the household pay any medical or educational expenses for anyone in the household? **Yes = Provide details** **No = 2**				7. Did the household pay any medical or educational expenses for anyone outside the household? **Yes = Provide details** **No = 2**			8. Did anyone outside the household pay educational or medical expenses for members of the household? **Yes = Provide details** **No = 2**		
ID code	School fee	Other educational expenditures	Medical expenditure	Medical expenditure	Educational expenditure	Relationship of the person with the household **Code (6a)**	Medical expenditure	Educational expenditure	Relationship of the person with the household **Code (6a)**

9. How much did the household spend on **local transport (for taxi in the city or others)** in the last 30 days? _____

10. How much did the household spend on **long distance transport** in the last 30 days? _____

Code (6a) Relationship
1 = Relative
2 = Friend
3 = NGO
4 = Other (specify)

Part III: Asset Ownership

1. Investment

Please provide details of the household's investments made [on business, housing, schooling and trainings] since *Tahisas 1998EC*

1. Type of activity invested on **Code (9a)**	2. When was the investment effected? ***(write month and Year)***	3. How much was the total investment in ETB?	4. What is the source of finance? Write the amount from each source in Birr.							5. Why do you prefer to invest in this activity? **Code (9b)**	6. Whom do you consult about the investment? **Code(9c)**
			Saving	Loan from bank/ MIF/ Dedebit	Loan from money lenders	Loan from Friends/ Relatives	Land Compensation	Inherited	Others (Specify)		

7. Did you take any training before you invest? **Yes =1, No = 2, GoTo Q9**	8. What type of training and for how long?			9. Did you take any training after you invest? **Yes =1, No = 2, GoTo Q11**	10. What type of training and for how long?			11. What are the constraints faced so far in the activity? **[Multiple answers up to three, Write them in order of importance]**		12. Is the activity still operating/ functional without changing its type? **Yes = 1** **No = 2**	13. If closed or changed in type, when and why?	
	Training type **Code (9d)**	Duration [days]	Training provider **Code (9e)**		Training type **Code (9d)**	Duration [days]	Training provider **Code (9e)**	**At Start-up Code (9f)**	**During Operation Code (9f)**		**When (year)**	**Why Code (9g)**

2. Possession of Durable Commodities

Provide the details of the household's durable goods

Item Description	1. Number owned	2. When and how did you obtain?		3. How much does this item sell now in the market?	4. Ownership **1 = Joint Household ownership** **2= Joint ownership with people outside the household** **3 = Individual** ownership (Write ID code)
		How obtained **Code (7a)**	Year (EC)		
Television					
DVD					
Radio					
Tape recorder					
Bicycle					
Motor cycle/ Bajaj					
Barrel (plastic or metal)					
Motor Vehicle					
Beds wood/metal					
Chairs					
Tables					
Sofa set					
Cupboard					
Buta Gas					
Electric *Megogo*					
Motor pump					
Jewelry (Gold)					
Jewelry (silver)					
Mobile phones					
Donkey cart					
Horse cart					
Others (specify)					

5. Did the household sell either of the items before? _____ **Yes = 1 , Give details No = 2, GoTo Next section**

Item Description	6. Number sold	7. When and why sold?		8. Ownership 1 = Joint Household ownership 2= Joint ownership with people outside the household 3 = Individual ownership (Write ID code)
		Reason sold **Code (7b)**	Year (EC)	

3. Household Dwelling Details

I. Please provide details of the **household dwelling**

Year	1. Type of house **Code (2a)**	2 Number of rooms	3.Type of Tenancy **Code (2b)**	4. If rented in, amount of rent per month	5. construction material of the house			5.Type of toilet **Code (2f)**	6. Type of Kitchen **Code (2g)**	7. Did you sell house **Yes = 1, No = 2, GoTo Q10**	8. When, how much and why?		
					Wall Code (2c)	**Roof Code (2d)**	**Floor Code (2e)**				Year	Amount	Reason **Code (2h)**
Tahsas 2004EC													
Tahsas 2003EC													
1998EC													

9. What is the household's main source of drinking water? **Code (2i)** _____

10. What is the household's main bathing facility? **Code (2j)** _____

11. What is the household's main source of energy for cooking? **Code (2k**)_____

4. Livestock Possession

Please provide details of the household's **livestock ownership**.

B) Animal type	2. How many … has the household own currently?		3. How many … has the household owned ***last Tahisa 2003EC***?	4. How many … has the household owned in **1998EC**
	Number	Equivalent value (Birr)	Number	Number
Ox				
Cow (local breed)				
Cow (exotic breed)				
Cow (hybrid/ improved/ cross breed)				
Calf/heifer				
Sheep				
Goat				
Donkey				
Mule				
Horse				
Chicken				
Beehives (bee colonies)				
Pig/pork				
Camel				
Others (specify)				

5. Household Land Ownership in

	In 1998EC	**In *Tahisas* 2003EC**	**In 2004EC**
Home stead **(in meter square)**			
Farm land **(in *tsimad*)**			

Part IV: Saving

1. Does any member of the household, member of *Equib*? _____ **Yes = 1, Give details** **No= 2 GoTo Q10**

ID code	2. Total contribution during ***the last 12 months*** (**since *Tahisas 2003EC***)	3. How many **times** does [name] ***contribute per month?***	4. How much did [name***] receive*** from the *Equib* in the last 12 months	5**. Duration** of the *Equib*	6. How much does [name] **expect to receive**?	7. **How many shares** does [name] have in the *Equib*?	8. What is the **value of one lot/share**?	9. What is the purpose of joining *Equib*? **Code (6h)**

Please give details about **saving in cash** by all members of the household during the **last 12 months**.

Saving instruments	Year in EC	10. Total amount saved during the last 12 months in […]	11. Main intended purpose of this saving **Code (6h)**	12. Actual use of the saving **Code (6h)**
Bank	2002			
	2003			
	2004			
MFI/Dedebit	2002			
	2003			
	2004			
Equib	2002			
	2003			
	2004			
Saving & credit associations	2002			
	2003			
	2004			
At Home	2002			
	2003			
	2004			
With relatives/ friends	2002			
	2003			
	2004			

I D code	13. Contribution per month to pension/ provident fund of [name]	14. Life insurance premium paid by [name] in the last 12 months

Part IV: Health

Ask these questions to household member who knows the health conditions of all household members.

1. Is there any member of the household suffered from any kind of illness or disability? _____
2. Yes = 2, Provide details No= 2, Go To Next Part

ID code	2. Since when [name] suffered? (year)	3. What kind of disabilities/sikness does [name] suffer from? **Code (7a)**	4. Does [name] have a vaccination card?	5. Has [name] suffered from any illness or injury last month? **Yes = 1, GoTo Q6** **No = 2, Next Person**	6. For how many days was [name] sick in the last four weeks?	7. Were any medicines bought for [name] during this time? **Yes = write in Birr** **No = 2**	8. Is [name] still suffering from the illness or injury? **Yes =1,** **No = 2, Next Person**

ID code	9. Did [name] seek a traditional/ modern treatment most recently? **Yes = 1, Go To Q11** **No= 2,**	10. Why not consulted? **Code (7b)**	11. Where was treatment sought for [name]? **Code (7c)**	14. Who accompanied [name] during the visits? **ID code**	15. How much time did [name] spend on travel (one way) plus waiting for treatment?	16. How much did [name] spend for the treatment?				
						Total	Fees	Medicine	Transport	Others

Part V: Household Shocks

Event ID	Negative Events	1. Since ***Tahisas*** 1998EC, does [EVENT] affect your welfare or economic situation? **Yes = 1** **No = 2**	2. How is the household affected by [EVENT]? **1 = Very badly** **2 = Badly** **3 = Not at all**	3. How did the [Event] affect the food consumption of the household? **1 = Very badly** **2 = Badly** **3 = Not at all**	4. What did the household do in response to [EVENT]? **Multiple answers up to three, write in order of importance** **Code (8a)**	5. Who else in the community experience this [Event]? **Code (8b)**
1	Work experience not fit for urban jobs					
2	Price increase in basic food items					
3	Shortage of food					
4	Head Job loss					
5	Other members of the household job loss					
6	Business bankruptcy					
7	Theft or property loss					
8	Divorce, separation or abandonment					
9	Death of head					
10	Death of spouse					
11	Death of other household member					
12	Illness/injury of head					
13	Illness/injury of spouse					
14	Illness/injury of other household member					
15	Crop Pests prevalence					
16	Drought					
17	Livestock loss (death, theft, …)					
18	Large increase in input prices					
19	Large decrease in output prices					
20	Others (specify)					

Part VI: Employment and Income

1. Business Activity except agriculture. For agricultural activities, go to Farming activities section page 16.

This section should be asked to all members of the household reported as **Employers** or **Own account workers** in **Part 1**, **section 1, question 6**.

ID Code	1. Is [name] own-account worker or employer? **Own-account =1** **Employer =2**	2. What is [name]'s main business? **Code(1a)**	3. Business location **Code (1b)**	4. Why it is located there? **Code (1c)**	5. Does the business have license? **Yes =1** **No = 2**	6. Why does [name] engage in the business? **Code (1d)**	7. Does [name]'s has separate manager? **Yes = Write level of education [G1..** **No = 2**	8. If [name]'s business employ workers, Provide details					
								Number of workers at **start-up**			Number of workers **last month**		
								Paid workers	Non-paid workers		Paid workers	Non-paid workers	
									Family	Non-family		Family	Non-family

ID Code	9. How did [name] setup/ acquire the business? **Code (1e)**	10. When did [name] setup/ acquire the business? **[year]**	11. Did the business have shared-ownership at start-up? **Yes =1** **No = 2**	12. Amount of capital or cost of acquisition of the main business		13. How much time did [name] spend at this business per month?		14. Is the main business of [name] separate from home? **Yes=1** **No=2**	15. What is the business status currently? **Code (1f)**	16. Does [name] keep accounts of her/his main business? **Yes=1** **No=2**
				Startup	Current	Hours/ day	Days/ month			

ID Code	17. What is the easiest time period for [name] to discuss the inputs and outputs of the main business **Code(1g)**	18. How much was last month's total costs and revenue of the main business of [name]?(in Birr)				19. How much is the highest, average and lowest monthly sales revenue during the year?						20. How much would [name] get if she/he sells the main business itself?	21. What would be the monthly wage to leave [name]'s business to become an employee?
		Paid labor cost	Non-owner/ Family labor[imputed value]	Non labor input costs + imputed value of own properties	Sales revenue	Highest Sales		Average sales		Lowest sales			
						Amount [Birr]	Month	Amount [Birr]	Month	Amount [Birr]	Month		

ID Code	22. Does [name] have any other job other than the main business? **Yes=1 No=2, GoTo Q25**	23. How much time did [name] spend at the second job?		24. What type of work does [name] do in the second job?		25. How much does [name] earn at the second job per month?	26. Was [name] ever unemployed before the main business? **Yes= 1 No=2, NEXT PERSON**	27. When was [name] last unemployed?			28. How did [name] look for work at that time? **Code (1i)**	29. How did [name] support herself/himself while unemployed? **Code (1k)**
		Hours/ day	**Days/ month**	**Sector Code (1h)**	**Occupation**			Year	Time spent unemployed			
									Years	Months		

3. Employment

I) Ask for all members of the household who are **15 years** old and above and **Currently Employees.**

ID Code	1. Whose is [name]'s employer and what does [Name] do?			2. Since when [name] is employed in this job? **[Write the Year]**	3. How much is [name]'s monthly wage/salary?	4. How many hours/day and days/month does [name] work on average?		5. Has [name] been employed before the current job? **Yes= 1, GoTo Q.6 No= 2, Next PERSON**
	Employer **Code (3a)**	**Sector Code (3b)**	**Occupation**			Hours/day	Days/month	

ID Code	6. How much was [name]'s gross monthly wage/salary?	7. When did [name] get the job and how long did [name] stay in it?			8. What was [name]'s main activity the year before the current job?			9. Was [name] promoted on the first job? **Yes =1 No = 2**	10. Did [name] receive any training on the first job? **Yes=1 No = 2**
		Year of first job	Duration stayed		**Employment status Code(3e)**	**Sector Code (3b)**	**Occupation**		
			Years	**Months**					

I) Ask for all Members of the household currently **Unemployed, Main activity code 16 and 17 in Part 1, section 1, question 6.**

ID Code	1. Has [name] ever been employed? **Yes =1** **No=2, GoTo Q8**	2. Year [name]last employed (EC)	3. What was [name]'s main activity			4. What was [name]'s gross monthly income	5. Duration in job		6. How did [name] lose the job? **Code (3g)**
			Employment status **Code (3e)**	**Sector** **Code (3b)**	**Occupation**		**Years**	Months	

ID Code	**7.** How does [name] support herself/himself now? **Code (3h)**	8. What is the lowest amount that [name] is willing to accept as gross monthly income?	9. How does [name] look for work? **Code (3i)**	10. Has [name] ever refused a job offer? **Yes= 1,** **No=2, GoTo Q13**	11. Why refused a job? **Code(3j)**	12. What type of work is [name] looking for?	
						Sector **Code (3b)**	**Occupation**

ID Code	1. What is the type of farming [name] engaged? **Code (2a)**	2. Why does [name] engaged in the activity? **Code (2b)**	3. How did [name] acquire land? **1 = Rent** **2 = Sharecropping** **3 = Owned,** **4= Other (specify, write)**	4. What is the size of land and how much is the land rent? [*tsimad]*					5. If rented, does [name] have written contract agreement? **Yes =1** **No =2**	6. What is [name]'s relationship with the land owner? **Code (2d)**	7. Where does [name] sell the products? **1= On farm** **2 = Market** **3 = On farm and Market**	8. How does [name] sell the products? **1 = Whole sale** **2 = Retail** **3 = Both**
				Rented in/sharecropped in/ leased in land			Owned/inherited land					
				Period **Code (2c)**	Land Size (Tsimad)	Amount of rent [Birr]	Land size (Tsimad)	Imputed rent [Birr]				

ID Code	10. What is [name]'s annual total cost?				11. Did [name]'s business have other owner-members or business partners? **Yes = 1,** **No = 2, GoTo Q15**	12. How many members?	13. How was the membership organized? **Code (2f)**	14. Did [name] business have a non-owner manager? **Yes= Write level of education [G1, G2…]** **No = 2**	15. What did [name] or the partners do to improve the business performance? **[Multiple answers possible]** **Code (2g)**	16. Did [name] or members receive any training regarding the business? **Yes = 1** **No= 2**	17. Who provide the training and for how long?	
	Non labor input cost		Labor cost								Provider **Code (2h)**	Duration [in Days]
	Own[Imputed value]	Rented/ purchased	Hired	Own[imputed value]								

2. Farming Activity

I) Ask this question to all members of the household whose main business activity is **Farming.**

ID Code	1. What is the type of farming [name] engaged? **Code (2a)**	2. Why does [name] engaged in the activity? **Code (2b)**	3. How did [name] acquire land? **1 = Rent** **2 = Sharecropping** **3 = Owned,** **4= Other (specify, write)**	4. What is the size of land and how much is the land rent? [*tsimad]*					5. If rented, does [name] have written contract agreement? **Yes =1** **No =2**	6. What is [name]'s relationship with the land owner? **Code (2d)**	7. Where does [name] sell the products? **1= On farm** **2 = Market** **3 = On farm and Market**	8. How does [name] sell the products? **1 = Whole sale** **2 = Retail** **3 = Both**
				Rented in/sharecropped in/ leased in land			Owned/inherited land					
				Period **Code (2c)**	Land Size (Tsimad)	Amount of rent [Birr]	Land size (Tsimad)	Imputed rent [Birr]				

ID Code	10. What is [name]'s annual total cost?				11. Did [name]'s business have other owner-members or business partners? **Yes = 1,** **No = 2, GoTo Q15**	12. How many members?	13. How was the membership organized? **Code (2f)**	14. Did [name] business have a non-owner manager? **Yes= Write level of education [G1, G2…]** **No = 2**	15. What did [name] or the partners do to improve the business performance? **[Multiple answers possible]** **Code (2g)**	16. Did [name] or members receive any training regarding the business? **Yes = 1** **No= 2**	17. Who provide the training and for how long?	
	Non labor input cost		Labor cost								Provider **Code (2h)**	Duration [in Days]
	Own[Imputed value]	Rented/ purchased	Hired	Own[imputed value]								

II) Annual Farm income from Crop and Sale of Livestock and Livestock Products

A) Crop type	1. What quantity … was harvested in the year 2004 EC?			
	Amount	**Unit [KG/LT]**	Equivalent value (Birr)	Total cost (labor + input)
Cereals				
Teff				
Barley				
Wheat				
Hanfets				
Maize				
Sorghum				
Pulses				
Lentil				
Cow pea				
Chick pea				
Horse bean				
Others (specify)				
Vegetables				
Onion				
Garlic				
Tomato				
Potato				
Fruits				
Animal feed				

B) Livestock Products	2. How much has the household earned from sales or consumption of [Item] ***since Tahisas 2003***?			
	Amount	**Unit [KG/LT]**	Value in Birr	If not for sales, value in Birr
Milk				
Butter				
Honey				
Egg				
C) Animal type sold/ consumed (*write the animal)*	3. How much has the household earned from sales/consumption of [Item] ***since Tahisas 2003***?			
	Amount	**Unit [KG/LT]**	Value in Birr	If not for sales, value in Birr

Part VII: Remittance, Pension and Other Annual Income

Please fill in the table below for every member of the household who has received remittance and has other sources of income ***since Tahisas 2002EC.***

ID Code	1. Did [**name**] receive any financial assistance? **Yes = 1** **No=2, Next Person**	2. How often did [name] receive financial assistance? **Code (9h)**	3. From whom did [name] receive and why?		
			Remitter Code (9i)	**Amount**	**Reason Code (9j)**

4. Did the household lease out any asset (land, livestock, motor pump, etc) **Yes = 1** **No=2, GoTo C**	5. How much was the total rent and for how long?			
	Asset type Code (9k)	**Rent**		**Duration**
		Cash	**Kind (value in cash**	

b) Participation in Public Works and Extension Packages *since Tahisas 2002EC.*

1. Has the household participate in safety net program? **Yes = 1,** **No = 2, GoTo Q4**	2. For how long and how much was the income?				3. If payment was in kind, what proportion was sold? **[Write in percentage]**	4. Did the household receive direct support? **Yes = Write the amount** **No = 2**	5. Did the household receive support from agricultural household packages? **Yes = 1** **No** = 2	6. What were the components of the package? [Multiple answers] **Code (9l)**	7. Which package was most beneficial to the household?	8. Was the household member of producers cooperative? **Yes = 1** **No = 2**
	Total number of days worked	**Payment**								
		In cash	**Kind**							
			Quantity	**Value in ETB**						

9. If the household has given out remittances, gifts or other transfers, what is the total amount paid out in the last 12 months? _____

10. What is Total pension income received in the last 12 months? _____

Part IX: Land Compensation and Utilization

1. Land Compensation

ID Code	1. What is the size the household's dwelling approved by the municipality? (M^2)	2. Did the household sold part of the dwelling? **Yes = 1** **No = 2, GoTo Q4**	3. How much was the price and why sold?		4. What is the type of compensation the household received for the farmland ***since Tahisas 1998EC***? **Money = 1,** **Plot of land = 2, GoTo Q9** **No = 3, GoTo Next Part**	5. When and how much did the household receive compensation?			6. How did the household utilize this money? (write the major three) **Code(3a)**		
			Price	Reason for selling **Code (3a)**		Year (EC)	Total land size compensated	Amount in Birr	1st	2nd	3rd

ID Code	7. Who has participated in the decision? **Code (3b)**	8. Who was the main decision maker in the household? **Code (3c)**	9. What is the size of land you received in exchange for your farmland?	10. How do you manage this plot? **Sold it = 1,** **Built house = 2, Go To Q12** **Nothing = 3**	11. How much was the price and for what purpose did you use the money?		12. What was the source of finance used to construct the house? **Code (3d)**	13. What is the purpose of the house? **1= for rent** **2= run own business** **3 = for sale** **4= others (specify)**
					Price	**Purpose** **Code (3a)**		

2. Utilization of Land Compensation Money

ID Code	1. How much did the household allocate the compensation money/ money from sale of land for ……? **[ETB]**			2. Did the household receive any official guidance or technical assistance on how to utilize the compensation money? **Yes = 1, Go To Q4** **No = 2, Go To Next Part**	4. Who was the provider? **Code (4a)**	5. What were the three main consumption expenditures and the amount spent?		6. What were the three main types of investments and how much spent?	
	Consumption	Investment	Saving			Type of Expenditure **Code (4b)**	Amount spent	Type of investment **Code (4c)**	Amount spent

Part XI: Perceptions on Welfare and Indicators of Welfare

1. How satisfied is the household after being an urban resident?
   1 = Very satisfied
   2 = Satisfied
   3 = Neither satisfied nor dissatisfied
   4 = Dissatisfied
   5 = Very dissatisfied

2. How has income of the household changed since being urban resident?
   1 = Much better 2= Somewhat Better
   3 = Same 4 = Somewhat worse
   5 = Much worse

3. Compared to the farm households in the peri-urban area, how do you rate your living condition?
   1 = Much better 2= Somewhat Better
   3 = Same 4 = Somewhat worse
   5 = Much worse

4. Compared to other households in this locality that become urban resident, how do you rate your household living condition?
   1 = Much better 2= Somewhat Better
   3 = Same 4 = Somewhat worse
   5 = Much worse

5. Since ***Tahsas 1998EC***, did the household purchase, improve or build a house?
   Yes = 1 No = 2

6. Since ***Tahsas 1998EC***, did the household purchase machinery, Motor pump or other durables?
   Yes = 1 No = 2

7. Since ***Tahsas 1998EC***, what improvements in government services have been useful to the Household? [Most three]
   1 = Better sanitation 2 = Better water supply
   3 = Better health care 4 = New or improved road
   5 = Better schooling 6 = None
   7 = Others (specify)

8. Can the household cover its food consumption expenses throughout the year?
   Yes = 1, Go To Q11 No = 2

9. Estimate the gap in months? _____

10. How did the household cover the gap?
    1 = Own saving 2 = Sale assets
    3 = Loan from friends/relatives 4 = *Equib*
    5 = Money lender 6 = Food aid
    7 = Others (specify) _____

11. What is the household's living condition compared to three years ago?
    1 = Much better 2= Somewhat Better
    3 = Same 4 = Somewhat worse
    5 = Much worse

12. What do you expect will be the household's life next year?
    1 = Much better 2= Somewhat Better
    3 = Same 4 = Somewhat worse
    5 = Much worse

13. What do you think will be the ex-farmers living condition next year in general?
    1 = Much better 2= Somewhat Better
    3 = Same 4 = Somewhat worse
    5 = Much worse

14. How do you feel about the land compensation?
    _____
    _____
    _____

15. Being urban resident for [years] in the town, how is the household's life compared to that of rural life? _____

1 = Better 2= No Change 3 = Worse

What are the main three reasons? _____ **[Use Code (2a), Write in order of importance]**

Code (2a) Reasons	
Better	**Worse**
1 = Able to own a new business or trade	9 = No regular income
2 = Able to built houses for rent	10 = illness
3 = Able to own livestock	11 = Have too many loans
4 = Have better own health/ spouse health	12= Not able to find a job
5 = Other, Specify	13 = Life is dearer
6 = Better job opportunity	14 = Divorce
7 = Living in a better house	15 = Death of household/spouse
8 = Have access to better infrastructure	16 = Job loss
21 = Others (specify)	18 = Money lost
	19 = Life is risky (no permanent income source)
	20 = Other (specify)

16. What is the current wealth status of the household compared to other household living in the locality?

1 = Rich 2 = Medium 3 = Poor 4 =Very Poor 5 = I don't know

17. Five years ago, what was the wealth status of the household compared to other households in the locality?

1 = Rich 2 = Medium 3 = Poor 4 =Very Poor 5 = I don't know

Biographical Sketch

Tsega Gebrekristos Mezgebo

Tsega earned a Bachelor of Science degree in Mathematics from Addis Ababa University, Ethiopia in 1992. Up on gradation, she was employed for ten years (1993-2003) as a teacher in SOS Hermann Gmeiner School, Mekelle under the SOS Children's Village Ethiopia. While working in SOS she earned Diploma in Management from Mekelle Business College, Ethiopia in 1998 and Bachelor of Arts in Economics from Mekelle University, Ethiopia in 2003. Up on completion of bachelor of in Arts in Economics, she joined Mekelle University and worked as graduate assistant in the department of Natural Resource Economics and Management for one year (2003-2004).

In 2004 she took a leave and studied Master of Science (MSc) in Mathematical Economics and Econometric Methods in School of Economics and Management, Tilburg University, The Netherlands. After finishing her MSc in 2006, she was reinstated in Mekelle University with a position of lecturer. In addition to her teaching and research responsibilities, she also served as associate dean for research and postgraduate programmes in the College of Dryland Agriculture and Natural Resources (2007-2008) and head of Natural Resources Economics and Management department (2008-2009). In October 2009, she took another leave to study for degree of Doctor of Philosophy in Rural Development at the department of Food Business and Development, University College of Cork (UCC). This dissertation is in partial fulfillment of the requirements for the PhD at UCC.

Tsega's research interest includes: rural nonfarm sector, rural-urban linkages; peri-urban development and sustainable urban development; poverty; farm household risk and investment; and natural resource economics.